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GOVERNMENT SPECIFICATIONS FOR MANGANESE BRONZE.

A CRITICISM OF PRESENT METHODS.—SUGGESTED IMPROVEMENTS.

BY JESSE L. JONES.

The United States Government is a rather important user of ingot manganese bronze and manganese bronze castings, in its various navy yards and arsenals. As the uses to which the material is put demand a very high-grade article, it is always purchased upon specifications. When it is recalled that the Government has at Watertown, Mass., one of the largest and best testing machines in the world and that it has also many expert chemists in the cities where its castings are made and inspected, it seems strange that the various Bureaus have not availed themselves of these sources of expert advice and that the specifications issued for manganese bronze are still so crude.

JESSE L. JONES.

CASTING MANGANESE BRONZE.

An outline of the specifications for ingot manganese bronze, given in Schedule 231, Bureau of Ordinance, dated September 1, 1908, is as follows:

1. The minimum physical properties required of a specimen 2" long between measuring points and ½" in diameter, are as follows:

Tensile strength	65,000 lbs. per sq. in.
Elastic limit	30,000 " " " "
Elongation	15%
Contraction	25%

2. The bronze must have the following approximate composition:

Copper	52%
Iron	1%
Zinc	46%
Tin	1%

Manganese; sufficient to make proper mixture.

3. The manganese bronze to be Parson's, Ajax or Reeves and unless for exceptional reasons the makes will be preferred in the order named. Bids on manganese bronze differing slightly from that specified will be considered, provided such differences are clearly noted and described by the bidder, and provided further that the bronze offered under these conditions is found to fully and equally well cover the specific requirements of the Government.

4. The bronze must stand a practical foundry test in making castings, etc.

PHYSICAL CHARACTERISTICS.

Reviewing the above specifications critically, it may be said that the tensile requirement is reasonable. The factors given for elongation and contraction are not, however, properly proportioned. In normal specimens these are about equal. A figure of 18% for the elongation and 18% for the contraction is easily attainable, as it is no uncommon thing for manganese bronze of good quality to have as high as 49% elongation in two inches. As to elastic limit, the wisdom of naming a definite figure (30,000 lbs.) is open to question, especially as the manner of determining it is not specified. Several years ago a contemporary metal journal announced that the elastic limit requirement for manganese bronze had been definitely abandoned by the Government as a result of tests made at the Watertown arsenal, in which it was shown that, unlike steel, manganese bronze has no definite elastic limit. Notwithstanding this work the elastic limit requirement still appears in the specifications.

In Figure No. 1 a comparison is made of the elastic limit of normal specimens of manganese bronze and steel, both cast in sand. The improvement in elastic limit of the manganese bronze is also shown in a very striking manner when it is forged. Forging of sand castings, however, is not advisable, for it is almost certain to produce internal flaws. The elastic limit of the specimens of manganese bronze given in this figure, if considered as the point at which there is a marked deviation from a straight line in the curve, would be about 10,000 lbs., and the material according to the specification would be subject to rejection, although of excellent quality. If on the other hand the elastic limit were to be determined by the dividers in the ordinary manner instead of by a curve plotted from accurate extensometer readings, the material would have an elastic limit of 20,000 to 40,000 lbs., depending on the man holding the dividers, and the material might or might not be passed. Hence it is evident that if an elastic limit is to be demanded, the manner in which it is to be determined should be exactly specified. The omission of any elastic limit requirement is desirable, but the privilege of using it to assist in determining whether shipments of manganese bronze are uniform and well alloyed, would be valuable. When an alloy of so complex a composition as this is not properly put together a very low elastic limit may be expected. Material giving an elastic limit taken with the dividers as low as 10,000 lbs. per square inch is not uncommon, when on the same sample 70,000 tensile strength and 30% elongation are obtained. An investigation of such material has always shown that it was poorly alloyed.

Much good manganese bronze has been rejected or misjudged in the past, because the buyer would insist on test pieces being cast in such a shape that it was impossible to feed them properly. Efforts have been made to have a form adopted that might be considered standard. Figure No. 2 gives a form that has been highly recommended. The test piece is cut from the dotted space. This method gives a solid test piece, but it has to be machined out from a rather large block of metal. A better form is shown in Figure No. 3, which gives a perfectly clean, sound test piece from which the gate and riser can be cut on a band saw in a few minutes.

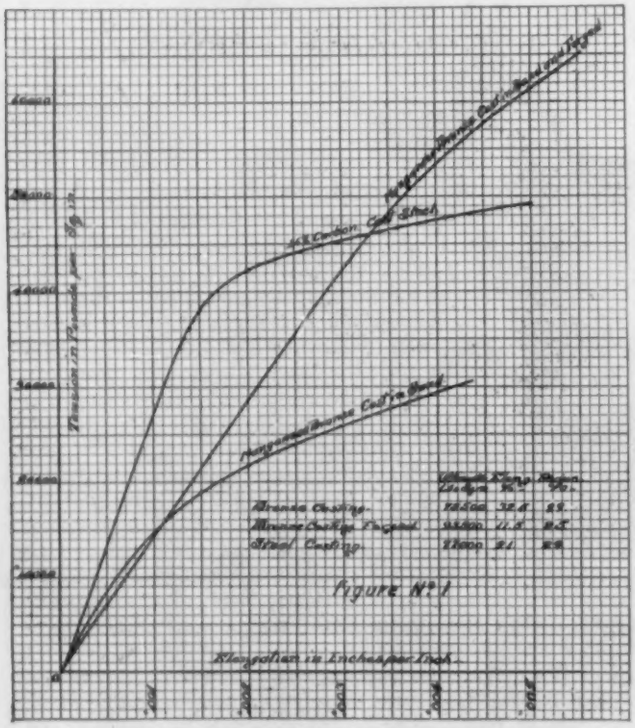


FIG. 1. CHART SHOWING ELASTIC LIMIT.

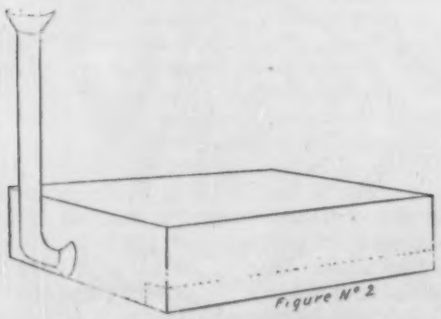


FIG. 2. PROPOSED STANDARD FORM FOR TEST PIECE.

Numerous comparative tests made upon test pieces cast in a sand mold from this pattern and test pieces cut from standard ingots (unnotched) poured from the same metal, have given identical results. The test piece cut from the ingot made in an iron mold has a more uniform looking fracture than the sand-cast test piece, but no better physical characteristics. Hence a test piece cut from the bottom of an unnotched ingot taken at random from any shipment or a test piece coupon cast on the side of a large propeller blade and fed by an iron chill ought to be considered just as reliable and representative by the purchaser as a sand-cast test piece.

CHEMICAL CHARACTERISTICS.

The specifying of the composition of manganese bronze as well as the physical characteristics it must possess, is hardly fair to the manufacturer. The composition given in the specification does not represent the material the Government is buying as manganese bronze. The presence of aluminum is necessary in manganese bronze that is to be used for sand castings, but no mention is made of aluminum in the Government specification. If any chemical requirements are to be inserted in the specification they should by all means refer to the necessity

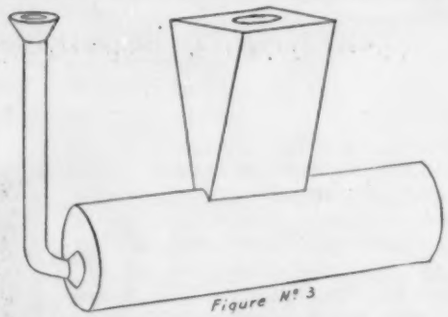


FIG. 3. IMPROVED STANDARD FORM FOR TEST PIECE.

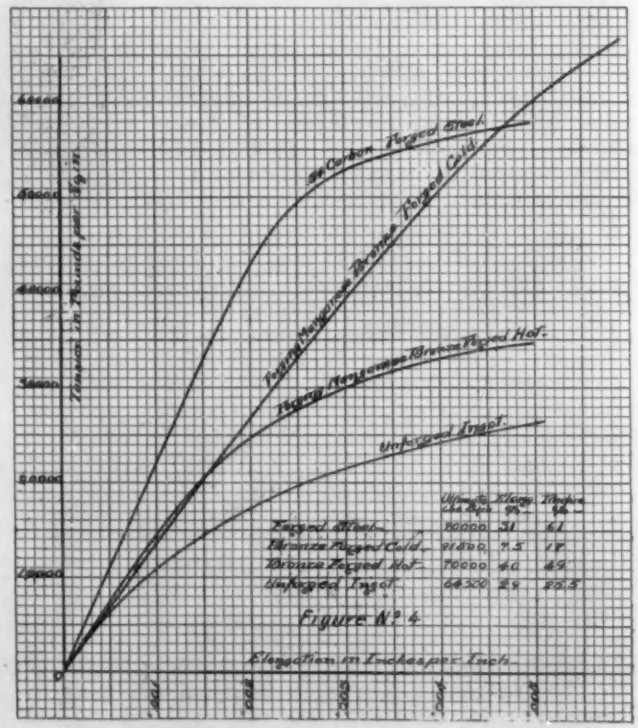


FIG. 4. CHART SHOWING PHYSICAL CHARACTERISTICS.

of excluding lead, which is introduced into the bronze by the use of common Western spelter. This only costs about one-half as much as high-grade spelter that is free from lead and the temptation to use it is correspondingly great. Any considerable amount of lead in manganese bronze causes it to rapidly deteriorate in quality when remelted.

If manganese bronze shows an analysis more than 1/10 of one per cent. lead, it is proof positive that high-grade spelter has not been used in its manufacture. Common Western spelter contains from 1% to 1.5% lead and its use should not be permitted.

PURCHASE BY BRANDS.

After giving both physical and chemical requirements, the announcing in the Government specifications that that manganese bronze will to all intents and purposes be purchased by brands, seems a little like "Piling Ossa upon Pelion." The firms making the brands mentioned are sufficiently well known not to need any free advertising. If any maker's goods meet the requirements his material ought not to be ranked below that of another maker.

SHOP TESTS.

The requirement that the bronze must stand a practical foundry test in making castings, etc., is also unfair to the manufacturer. Put in plain English, it means that if the employees of any Government foundry are not sufficiently familiar with the handling of manganese bronze to obtain good results from it, the manufacturer must send one of his experts at considerable expense to demonstrate how the metal should be handled or run the risk of having his shipment condemned and returned to him.

There is as much difference between the making of manganese bronze castings and ordinary brass castings as there is between the making of steel castings and gray iron castings. Hence if manganese bronze is to be used in a Government foundry where it was never before used, the foreman of the foundry ought to be sent to the plant of the maker of the ingot metal to learn how to handle it, rather than that the maker of the ingot has to send one of his employees to the Government foundry.

FORGING MANGANESE BRONZE.

Schedule 1032 of the Bureau of Ordinance, April 21, 1908, gives a specification for manganese bronze forgings, of which the following is a synopsis:

1. The forgings shall be free from seams, flaws and defects of every description.
2. To have an elastic limit of not less than 35 tons per square inch with a percentage of elongation not less than 20% in a specimen 4 diameters of acting length.
3. Composition:

Copper by weight .....60 parts
Zinc " " ..... 40 "
Ferro-manganese containing—
Manganese ....80 parts
Iron .....12.2 "
Silicon ..... 0.6 " .....4½ "
Aluminum—
Phosphor 24 parts
Carbon . 6.8 " ..... ¾ "

No intelligent manufacturer of manganese bronze would try to meet the above specification's physical requirements by the use of such a hodge-podge mixture as that given. There is certainly no alloy of aluminum containing 24 parts of phosphorus and 6.8 parts of carbon. No aluminum is used in the manufacture of forging manganese bronze, and the above analysis does not represent the composition of the forging manganese bronze that the Government buys. Figure No. 4 gives the physical characteristics of normal specimens of forging manganese bronze, unforged, forged hot and forged cold and for comparison tests of a sample of 0.54 carbon-forged steel. It is evident that forging manganese bronze does not possess inherently an elastic limit that is any higher than that of casting manganese bronze, and that the acquired hardness due to cold forging is liable to be accompanied by internal flaws. The elastic limit of the cold forged specimen may be taken at 55,000 and by the dividers possibly it would reach the 35 tons required in the specification. The manufacturer who attempted to meet this specification had a tough proposition before him, and if he succeeded in filling it he deserves a Carnegie medal. Forging manganese bronze should be made from high-grade copper and zinc and should not show on analysis more than 1/10 of 1% lead. Billets should be rough turned before forging and not less than ⅓ discarded from the top of each.

CONCLUSIONS.

The specifications of the various Bureaus, for both casting and forging manganese bronze (especially for the latter), could be standardized and revised with marked advantage both to the Government and the manufacturers. We naturally look to the Government for specifications that may be considered standard. Large manufacturing concerns are continually revising the specifications they issue because of intelligent criticism by manufacturers and other experts, and it is only by such criticism and revision that a high standard can be maintained.

THE MANUFACTURE OF PHOSPHOR-TIN.

The ordinary method of making phosphor-tin is to introduce the phosphorus into the molten tin by means of a black lead phosphorizer. This method is not, however, as satisfactory as the following plan:

Sponge tin is prepared by melting pure Straits tin and pouring it from a height of several feet into a bosh or tub supplied with running water. The sponge tin is then removed and thoroughly dried, or the tin may be prepared in the form of fine shavings.

The phosphorus used is the yellow cake phosphorus made and supplied in one or two-pound cakes. These cakes are placed in a saturated solution of copper sulphate for about ten minutes, shortly before they are used. This gives them a very thin coating of metallic copper so that they may be handled with safety, and they are dried by rolling in sawdust.

The requisite amount of phosphorus (5% is the usual content for phosphor-tin) is placed in the bottom of a black lead crucible, covered with the dry, sponge tin, some powdered charcoal added and the lid of the crucible tightly mudded on with a mixture of loam and fireclay. The crucible is heated with a slow heat until the phosphorus has cut the tin and combined with it. The resulting phosphor-tin is then skimmed and poured into suitable molds, preferably of small size, and set in running water like solder molds.

The new process for recovering tin, in the form of chloride of tin, from tin scrap by treating it with dry chlorin gas, is being extensively used in Germany and is rapidly driving the older processes from the field. The company that controls the German patents on this process is at the present time detinning about 50,000 tons of tin scrap a year. The resulting competition has raised the price of tin scrap much above its true value.

Since Japan is a great copper producing country and exports the metal in large quantities, it is to be expected that it will soon be manufacturing not only the electric wire required for home consumption, but will be exporting wire to China and Korea. Last year electric wire to the value of $564,782 was imported, most of it coming from the United Kingdom.

United States General-Appraiser McClelland has decided that blue clay for making crucibles shall be admitted free of duty whether packed in cases or in casks.

COPPER ROLLING MILL PRACTICE.

A Series of Articles on the Subject.

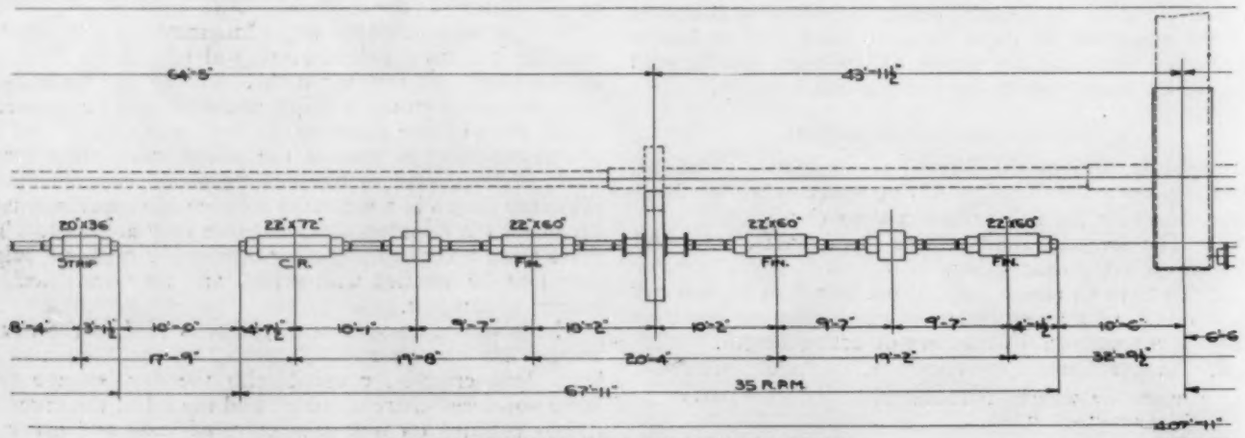
By Copperman.

INTRODUCTORY.

It shall be the object of the writer in this article to give a good general description of sheet copper mills in use today, and perhaps later in other articles, to take up the subject of manufacture, and describe the present processes. No names of firms will be mentioned, but the statements made regarding features of the mills can be verified, and many copper mill superintendents or managers may know some of the mills referred to, perhaps their own included. Comparative information, such as will be given, is seldom published, simply because few who have this information are in a position to give it to the public. Many articles might be written that would go into details more fully and much better than will be done here, and the writer hopes this may lead to other articles from other sources relative to the same subject. By such means we may all learn much that we do not know or fully understand, and generally speaking, no one will be injured, and perhaps some good come to many.

ELECTRICITY AS POWER.

The question of electric-driven rolls has been much talked about, but most concerns have been very reluctant to "try experiments." As a matter of fact, the use of motors instead of engines for motive power has passed the experimental stage, if we but consider the results that have been attained by their use in steel plants, and their increasing prestige. The question of a motor to drive a train of, say, four to eight pair rolls for rolling copper or brass, where the average load is practically constant, presents a much simpler problem than has been faced by the steel engineers in the driving of rail, structural and plate mills, where the load necessarily varies from friction to an enormous one in a very short interval of time, especially on plate mills. So far as a motor drive for a copper mill goes, the main issues are: first, the choice of a proper sized motor to carry the average rolling load, designed with a heavy flywheel to assist on over loads for short intervals of time; and second, the working out of a proper reduction from the motor speed to the roll speed required, to avoid unnecessary wear and tear, and the noise that always goes with high speed heavy gearing, especially if the gears are of steel or semi-steel. A rope drive, from a sheave on the motor, to a large, very heavy sheave on the mill shaft, is much better than gears.



CENTRAL PORTION OF A COPPER MILL DRIVE. ENGINE.

TRADE CONSERVATISM.

There has always been among the brass and copper companies a very strong tendency to observe great secrecy regarding their processes, and, especially so, where machinery having any new or particularly radical features is concerned. In this respect they are very unlike the steel manufacturers, who are quite free to publish news regarding their installations, processes and outputs. The building of copper mill machinery and equipment has in the past been confined to a very few firms, all of whom are well known, and their quality of machinery well understood and appreciated. In late years, however, builders of steel mills, in the Pittsburg district, have had a fair share of new work, especially so far as rolling mills, engines, and shears go. In so doing, they have come more to the notice of the copper mill men the country over, and their installations are critically watched, to see how their machinery stands up. In most cases they have simply gone by specifications, and have had little or nothing to do in the general layout of the mills, which fact must be taken into consideration when criticisms are being made. Their installations include the latest remodeled and also the most recently built copper mills, in which some new features, including electric drive, have been introduced. In the last built mill some of the equipment may be changed to advantage, but the fault does not lay with the builders, but with the specifications, and in the layout in the first place.

If alternating current of high frequency, say 60 cycles, be the source of power, the problem of reducing the motor speed to roll speed by gears becomes especially difficult. If a lower frequency is available, or if a special motor with more poles be used (which gives the same power as a standard motor, but at slower speed and higher cost for the motor), the reduction can be much more satisfactorily made. It remains to be seen to what extent electricity will replace steam as a copper mill power. There are many who firmly believe that in a few years, now that the ice has been broken by one company using nothing else for power, and still others using it to drive parts of their rolling mills, that its use will rapidly increase. Not that it will come to the point where individual mills will have independent drive, as the first cost would be prohibitive. But the result will probably be the grouping of rolls into small, separately-driven sections, the rolls going to make up a section being selected because of their adaptability

to a class of work that would call for their so grouping. Thus, for an increased first cost, a great saving in power and maintenance would be possible many times when only certain classes of work were to be done.

It is no uncommon thing in mills in use to-day to see an engine of from 400 to 1,200 h. p. dragging a friction load due to from six to sixteen pair of rolls, for the sake of getting work done on a single pair, often times cold rolls, whose average rolling load might not be 5 h. p. above its own friction. It is a fact that in many mills the shafting is driven from the main engine with no means provided for shifting it over to a smaller engine, or to a motor, and the whole mill turns over while a dozen men work overtime in the finishing room, shearing, drying out, polishing, etc. The writer knows of one place where 250 to 275 h. p. in friction is carried to get the use of some shafting that could be driven easily by a 15 h. p. motor. On a basis of 10 hours per week overtime under these conditions, the motor would save $10 per week in fuel alone, to say nothing of wear and tear on the mill, cost of neckgrease, extra labor, etc.

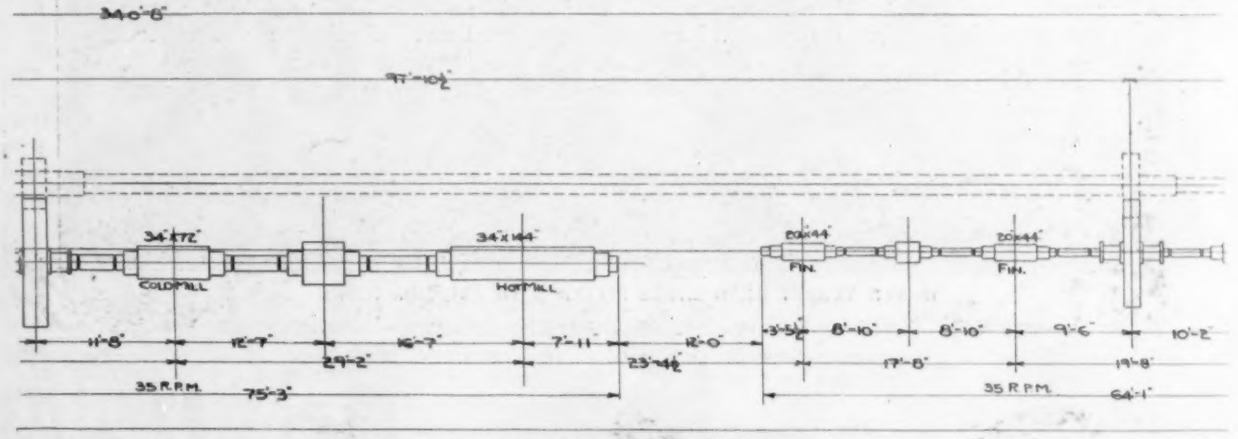
METHODS OF DRIVING ROLLS.

In the copper mills of to-day two distinct methods of drive are common. In one the drive is direct from pair to pair through pinions and rolls, the entire train being driven at the same speed in revolutions per minute, and receiving its power at or near the middle point. In the other, the same method is employed that is so common in brass mills, the engine being connected by belt, rope drive, or gearing to an underground line shaft, which drives groups of rolls by different pinions and gears.

THE DIRECT DRIVE.

The first mentioned installation is the cheapest that can be put in, and has the lowest friction load per pair rolls. Yet the method has many disadvantages which more than offset its lower first cost. In the first place, there can be but one speed to the train, and unless the rolls used are practically of the same diameter and for the same purpose, there will of necessity be some that cannot be worked at their best efficiency. Speed for hot rolling packs cannot go above or below certain limits for good results, and if there be any large diameter rolls, say 30 inches or over that have been coupled into a train of 20 to 24 inch rolls, with the speed proper for the latter sizes, the large mills will work at a disadvantage. Their speed will be entirely too high and the shock on the mill too great to put the proper amount of draft or pinch on the sheet or sheets in rolling. Not only that, but it raises the friction load considerably per pair on the average.

In this type of roll train, the greatest trouble in its operation is the keeping of the different mills and pinions properly lined up to prevent back-lash. The breaking down rolls are placed next the drive, thus giving them plenty of power and making them steady, being held down by the balance of the train on that side of the drive. The copper mill master mechanic has no idea of line up as practiced by the steel mill master mechanic, and he could save his company many dollars each year from unnecessary delays, if they would send him to some large sheet steel or tin plate mill and make a study of their method of lining up and keeping in line. He should be interested in looking through the catalogues of some of the large builders of tin mills, where he will see illustrations of long trains of rolls installed on the same bed plate and all driven direct at the same speed. There are trains consisting, on one side of the drive, of as high as four finishing mills, four roughing mills, two stand of pinions and two pair cold rolls, and I wish to say that back lash does not trouble them. Yet such a train, in a copper mill, is a continual source of repair and delay. The strain on one of these mills on steel packs is greater than that on a similar mill for sheet copper, but no roller watches any other roller to see when he sticks his pieces or packs. In copper mills, direct driven, this is done, so that metal will not be entered into two or more pair of rolls at the same instant. If the rollers become careless and neglect to do this, the result, sooner or later, is bound to be a smash of spindles or couplings, and catch two to four pair of rolls with pieces or packs entered. In the case of a break like this, the loss in wages and in output while the break is being repaired is considerable, as it is often impossible to back the mill and release the rolls. If this cannot be done, the screws on some of the mills must be released, one at a time, by means of a long timber lever and rope tackle. Meantime, if the break be near the drive, practically the entire train will be idle while the screws are being loosened up.

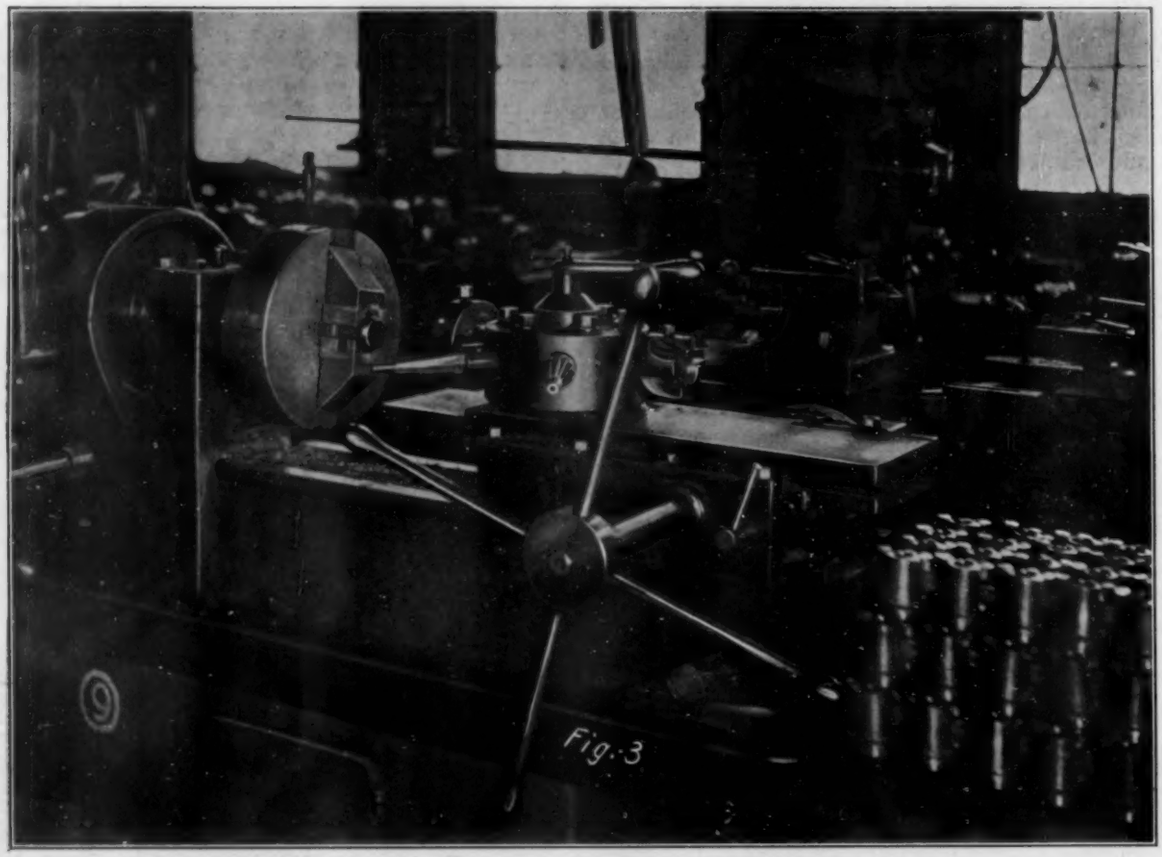


SHOWING HOT, COLD, STRIP AND FINISHING ROLLS.

(To be continued.)

The finest platinum deposit in the whole globe is passing out of Russian hands. A large share of the working of platinum has already fallen into the hands of share companies headed by foreigners, and the production of platinum in the mining works has been secured by Englishmen and Americans; such large factories as the Taghil, Demidov and Schuvalov have sold all their production of platinum for a period of years to foreigners for £1,200 (£=$4.86) per pood, whereas it is now worth on the exchange £3,000 per pood.

TURRET LATHE AND SPECIAL TOOLS.

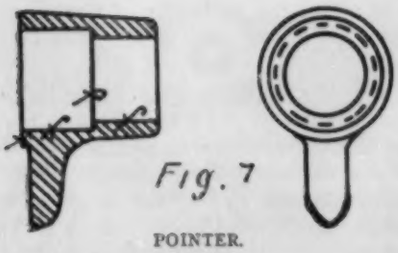


18-INCH TURRET HEAD LATHE FITTED WITH FRICTION HEAD.

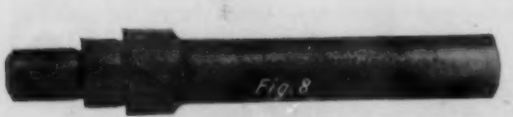
HOLLOW MILL.

BODY.

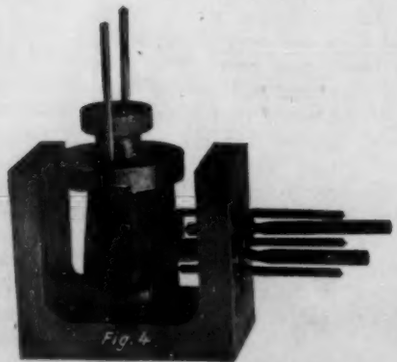
TAPER PLUG.



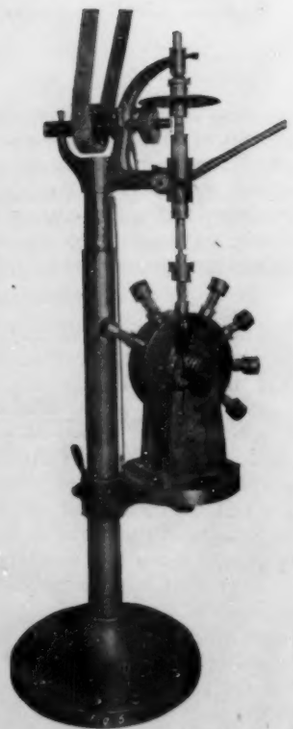
POINTER.



BORING TOOL.



DRILLING JIG FOR BODY.



TURRET DRILLING JIG.

SPECIAL TOOLS IN THE BRASS SHOP.

By Geo. W. Fleming.

GEORGE W. FLEMING.

There is a wide variation in outputs on turret lathes from one shop to another on similar work. We often hear of costs on various pieces of work and are skeptical. Surely there must be a cause for such difference in costs on similar work produced on similar machines. If we go to the bottom of the matter we will find one reason. That reason will be tools used. Many shops operating turret lathes are prone to think that it is only necessary to have a turret lathe and any old equipment of tools will bring results. Good tools are as necessary as the machine itself. In designing special turret tools there are conditions that must be considered which make for or against economy.

First and foremost, the quantity is an item of importance, the choice between an expensive tool that will give a maximum production and a cheaper tool that will give a smaller production must many times be in favor of the latter. The difference in cost between the two might offset the saving in labor, unless the tool could be so constructed as to handle other work and be worth something as salvage.

Second, tools should be designed to take the burden of certainty from the workman, so as to permit of a cheaper grade of workman to operate the machine.

The writer has found in his experience that the highest production on a turret lathe does not always come from the highest grade of machinist—but rather some bright young operator that has never served his time as a machinist or tool maker will far exceed either. A regular machinist is apt to be slower and more clumsy. He cannot connect speed and accuracy in the same light.

The indexing of a turret only takes a second, but do we always take into consideration the number of times this operation takes place in a day? It is practical many times to combine several tools into one to good advantage. This is well illustrated by a combination hollow mill shown in Fig. (1). Where quantity permits this tool is far in advance of a box tool. It is easier to maintain cutting edge and size, and as for setting and grinding it meets all such conditions favorably. This tool is much more rigid than a box tool and permits of accurate work with high speed. Its rigidity is easily comprehended when we consider the backing of cutting edge on this tool compared to that on a cutting tool in a box tool. This same principle holds good on the reverse order of work, i. e., for internal turning. Such a tool resolves itself into a counterbore. These tools are inexpensive when the results are considered. They can be made to good advantage in any shop equipped with an engine lathe and either a milling machine or a shaper, the former preferable of course.

As an example of a very efficient set of tools the following are representive of good practice. The parts shown are of a patent natural gas burner mixing valve and are of cast brass throughout. The body is shown in Fig. (2) and is finished on an 18-inch turret head chucking lathe fitted with friction head, two jaw chuck having inserted jaws and with set of tools shown in Fig. (3).

First operation, combination hollow milling and facing tool.

Second operation, threading, and at this point the advantage is taken of friction head and die is fed on with slow speed through back gears and is led off on high speed without back gears.

Third operation, machine is stopped and a steel cap screwed on over threaded portion to prevent distortion of that end from reamers. This is necessary, as the reamed hole is for a ground joint and if it was reamed without use of steel cap over threaded portion it requires considerable longer time in grinding, as the latter must be done with the regular brass cap nut on.

Fourth operation, rough ream, taper hole. Reamers are made with guide on end, centering in a bushing in the spindle of headstock which insures hole aligning with other turned portion of the body.

Fifth operation, finish ream, taper hole. This reamer is also fitted with guide for alignment.

The drilling operations on the body are taken care of in one setting by using a simple box type jig as shown in Fig. (4) and a three-spindle sensitive drill.

The taper plug shown in Fig. (5), which fits into the body, presents a piece of work demanding well designed tools to obtain a maximum production. The turning operations are adapted to a double head taper turning lathe. The drilling operation is complexing; there are several rows of holes, three holes in a row and each row of a different size. Very good results have been obtained in the use of the turret drilling jig shown in Fig. (6). This jig is so designed that the operator cannot go wrong. The taper plugs will only fit into jig in the right relation to its slotted portion and sleeve carrying it is tied to turret head so the correct size drill only can come into operation.

This permits of its operation by a boy with the assurance that all holes drilled will register properly with the dial on top of body. The drilling operation is done after a roughing cut has been taken and after drilling is completed the finishing cut is taken on a taper-turning lathe.

The pointer shown in Fig. (7) is handled in a light turret lathe in one operation and with one tool shown in Fig. (8). The turret lathe was fitted with a friction countershaft and the shifter lever was tied to back of turret slide by means of a rod, so that at a certain point forward the clutch was thrown in for forward speed, and upon withdrawing the tool and turret from the work, the clutch was thrown out so as to stop the machine, resulting in the entire work on this entire piece being done in one operation; the operator does not have to pay any attention to starting and stopping machine, which confines his attention to putting pieces into chuck, and advancing tool to the work and back again to remove work from the chuck.

These examples of special tools are given, not as extraordinary tools, nor to instruct turret lathe experts, but rather for the benefit of the smaller user who only operates a machine or two. There are many ways these could be improved upon no doubt under different conditions, but under the condition they were designed to meet they have made good and resulted in a high production with minimum priced labor.

TWENTY YEARS OF ALUMINUM MANUFACTURE.

By Aluminuman.

Prior to 1888 all the aluminum on the market was produced by the Deville process, which consisted in reducing the metal from anhydrous aluminum chloride by means of metallic sodium. As both of these materials were expensive, the resulting aluminum was expensive. The metal made by this process first came on the market in 1856 and sold for $90.00 a pound. By 1862 this process was so far improved that the price had fallen to $12.00 per pound, at which point it remained until 1886. In 1886, by the use of Webster's improved process for the manufacture of aluminum chloride and Castner's newly invented process for the manufacture of sodium, the price of the metal was reduced to $5.00 per pound, at which point it remained until the year 1889.

During the year 1886 Charles M. Hall of Oberlin, Ohio, then recently graduated from Oberlin College, discovered that aluminum oxide is dissolved by molten fluorides and that it may be electrolyzed therefrom in the same manner that any other solution may be electrolyzed.

On this discovery rests the manufacture of aluminum as it at present exists. Mr. Hall applied for patents in 1886, which were granted to him in 1889. Early in 1888 Mr. Romaine C. Cole, representing Mr. Hall, came to Pittsburg and offered the process invented by Mr. Hall to Captain Alfred E. Hunt.

Captain Hunt thereupon formed a syndicate consisting of himself, his partner in the steel and laboratory business, Mr. George H. Clapp; Mr. R. J. Scott, then superintendent of the Union Mills of the Carnegie Steel Company, which was then known as Carnegie, Phipps & Co.; Mr. Horace Lash, the well-known steel expert, who at that time was the president of the Carbon Steel Company at Pittsburg; Mr. Winfield S. Sample, who was connected with the Pittsburg Testing Laboratory, now a resident of England, and Col. Millard H. Hunsiker, who at that time was general sales agent of the Carbon Steel Company, but who is now well known as the head of the United States Steel Products Company, the exporting company of the United States Steel Corporation.

These gentlemen formed the Pittsburg Reduction Company and built an experimental plant for the production of aluminum by this process on Smallman street in the city of Pittsburg. This plant was completed in November, 1888, and consisted of two boilers, a 125 horse power Westinghouse engine and two 1,200 ampere-25 volt generators, and operations were begun with Captain Hunt as president, Mr. A. V. Davis as superintendent, with a force consisting of two engineers, one laborer and one office boy, with Mr. Hall and Mr. Davis to direct operations.

Two reduction pots were operated in this plant and the capacity of the plant was estimated to be 75 pounds of aluminum per day. The practical working of the process was very little understood at that time and much discouragement and many unforeseen and apparently inexplicable difficulties were encountered. Owing to this the plant ran for some time without producing any aluminum at all. The first successful "run" took place in January, 1889, the product of this "run" consisting of a piece of aluminum about as large as a button. This first day's "run" unaccountably disappeared, a lengthy search disclosing the fact that it had been appropriated by the office boy and it was located in his vest pocket, this incident closing this particular office boy's connection with the institution.

In 1890 the plant was increased by the addition of two 300 horse power engines and two 2,500 ampere-50 volt Westinghouse generators, together with the necessary boilers and reduction pots, and the output capacity was correspondingly increased; but as aluminum at the hitherto-unheard-of price of $1.50 per pound was a new thing, the market for it did not require the operation of the plant to its full capacity, about 300 pounds per day being made, and even with this output large quantities of the metal accumulated and had to be stored awaiting the growth of a demand. As can be readily imagined from the prices named prior to this

FOUNDERS AND OFFICERS OF THE ALUMINUM COMPANY OF AMERICA.

ALFRED E. HUNT. First President.

CHARLES M. HALL. Vice-President.

ARTHUR V. DAVIS. Secretary and Gen. Manager.

ROBERT B. MELLON. President.

time, aluminum had been used only in the manufacture of small articles of considerable value and the public had not yet become familiar with it as a common metal. The reduction in prices beginning with the Hall process, however, gradually extended the market and the metal began to be used much more widely, the first substantial quantities being used just as it is used today, for addition in small quantities to open hearth steel for the purpose of deoxidation and improving the quality of the steel and soundness to the tops of steel billets.

About this time the use of the material for cooking utensils began and in 1891 the price was further reduced to $1.00 per pound and the demand stimulated so that the plant at Smallman street grew too small and a large plot of ground was secured at New Kensington, Penna., about eighteen miles north of Pittsburg on the Allegheny river, and a plant located on what is now the site of the New Kensington Works of the Aluminum Company of America. Further additions were made to this reduction plant from time to time.

Until 1893 Captain Hunt devoted only a portion of his time to the business of the Pittsburg Reduction Company, the offices of which were at first located on the premises of the Pittsburg Testing Laboratory and shared by that organization, afterwards being separated from the Testing Laboratory Company's office by removal to the Ferguson building in Pittsburg, but in 1893 the offices were removed to New Kensington, and Captain Hunt began to devote practically his whole time to the company, Mr. Davis being appointed general manager and Mr. E. C. Darling, who had entered the company's employ in 1891, appointed superintendent.

Prior to 1893 much difficulty was encountered in marketing aluminum in the form of sheet due to the fact that rolling it on a commercial scale was a new problem. Until 1893 it was attempted to have the sheet rolled in brass rolling mills and aluminum shapes made in the steel rolling mills, but this method was found so unsatisfactory that in 1893 the company installed two sets of sheet rolls and began the rolling of sheet and the marketing of the metal in that form and from this time the field for aluminum was greatly widened, innumerable new uses for it being discovered from day to day.

In 1895 a 1,000 horse power Porter-Allen engine and additional rolls were installed, increases having been made from time to time in the metal capacity of the plant to keep pace with the demand.

Meanwhile, the price of the metal was continually settling—to 75 cents in 1893, 50 cents in 1894 and finally to 35 cents a pound in 1895, the metal thus selling at a price so low as to have been undreamed of in 1888, when the company was started, and which, if it could have been foreseen, would probably have altogether prevented the initial investment.

On account of the price having fallen to such a comparatively low point in 1895 it became necessary to find means to decrease the cost of production. At about this time power became available at Niagara Falls and the company built a reduction plant there, taking power from the Niagara Falls Power Company, being the first large power consumer of that company.

Under the stimulus of a 35 cent price the market for aluminum extended with great rapidity and the variety of uses to which it began to be put was inconceivable. By this time it had become standard practice to use it in the manufacture of open hearth steel, its use for cooking utensils had become firmly established and an infinite number of articles of every-day use were stamped from aluminum sheet.

In 1898 the company threw into commission an additional plant at Niagara Falls, considerably larger than the one already in service. This was followed for the second time in the company's history by a large overproduction and the necessity for storing aluminum and "hard times" for the company, but in 1899 the situation became relieved by the beginning of one of the most important uses to which aluminum has been put, that is, in its capacity as an electrical conductor. Some experimenting with aluminum for this purpose had been done in two previous years, aluminum rods being rolled and wire drawn by the Washburn & Moen Company, but during this year the company installed its own wire mill and rod rolling mill at the New Kensington works. The first installations of wire, made in 1899, were successful, and from that date large quantities of the metal have been used for this purpose.

In 1899 the company and the industry generally suffered a severe loss in the death of Captain Alfred E. Hunt, who had been president of the company from its beginning and to whose untiring energy and unfailing optimism in the face of discouragement the industry is largely indebted for the rapid progress it made from the beginning of his connection with it until his death. After the death of Captain Hunt, Mr. R. B. Mellon, of Pittsburg, was elected president of the company, Mr. A. V. Davis, secretary and general manager, the principal portion of the work previously done by Captain Hunt as well as his own work falling on the shoulders of Mr. Davis.

The year 1900 marked the beginning of a period of very rapid increase in the aluminum business. In that year the use of aluminum as an electrical conductor assumed substantial proportions, the company getting a single order for over a million pounds of aluminum for electrical conductors to be used by the Standard Electric Company of California, transmitting power from its power house at Electra in Amador county to San Jose, Oakland and San Francisco. Other extensive orders were also received for the equipment of other transmission lines both in California and other of the Western States for the distribution system of a large number of electric railway companies throughout the country.

This year also marked the beginning of the use of aluminum in substantial quantities as a constituent part of automobiles, experiments having been carried on for several years previously to enable the adaptation of aluminum for this purpose.

In 1901 the company built a large additional plant for the manufacture of aluminum at Massena, St. Lawrence county, New York, the power for the operation of this plant being taken from the power house of the St. Lawrence River Power Company. This plant was thrown into operation in 1902 and the company's wire mill, which had previously been located at New Kensington, was transferred to Massena.

During 1901 the company also began the erection of a plant at East St. Louis for the manufacture of alumina from bauxite, the amount of alumina obtainable in the chemical market beginning to be insufficient to supply the demand. This plant was put in operation in 1902 and since that time has supplied a large proportion of the raw material required in the production of aluminum.

The year 1902 also marked the beginning of the use of aluminum as the interior lining of metal cars, a large proportion of the cars for the New York Subway

being equipped with aluminum linings, these cars going into service when the Subway opened and having proven the most satisfactory cars in use there. From 1902 until the end of 1905 the growth, both in the number of uses of aluminum and of the extension of quantities in the old uses, had a steady increase and development, the company just being able to keep pace with the demand for the metal.

Early in 1906 a combination of conditions occurred causing a sudden very rapid increase and general improvement in the demand for the metal. This condition arose from the sudden tremendous increase in the number of automobiles manufactured, each machine requiring a greater or less quantity of aluminum for its production, a strong demand for aluminum electrical conductors, the normal expansion of demand for aluminum for general purposes, coupled with a shortage in the supply of metal in Europe due to severe droughts there for the three previous years, which culminated in low water and deficiency of power at the aluminum plants in Europe in 1906. The sudden unprecedented demand coupled with diminution of the usual European supply made it wholly impossible for the company to meet the demand for aluminum during the years of 1906 and 1907, but plans of extension on a scale entirely surpassing any previous extension in the aluminum business were undertaken with the greatest possible promptitude and pushed to completion as rapidly as possible, a very large additional plant being installed at Niagara Falls and the plant at Massena greatly extended.

In 1906 the management of the company concluded that it would be desirable that the company's name should give a better indication of the nature of its business and accordingly in January, 1907, the company's name was changed to its present one—the Aluminum Company of America.

The aluminum business, in common with all other business, felt the depression beginning in the fall of 1907 and still suffers from that depression, the amount of metal now being used being no greater than it was in 1906, before the immense plant extensions were built. This, in conjunction with the fact that normal weather conditions returned in Europe and the building of many large aluminum plants there due to the stimulation felt in 1906, has caused the world's capacity for producing aluminum to be several times the ability of the market to absorb it at present and it now seems probable that no further extensions in capacity will be required for many years and that none are likely to be made on account of the fact that the large overproduction resulting from the conditions enumerated has reduced the price of aluminum to figures hitherto unknown and rendered the business unattractive from a financial standpoint.

The company's latest plate at Niagara Falls, known as No. 3, is the largest plant in the world for reducing aluminum from its ores and has a capacity for making in forty-five days as much aluminum as had been produced in the entire world from the beginning of its production until the year 1892. This plant is furnished with power from the company's generators located in the new power house of the Niagara Falls Hydraulic Power & Manufacturing Company through ten of these generators each of 5,000 horse power, these being the largest direct current generators (in point of capacity) which have ever been built. Two of them are coupled together and these coupled to a 10,000 horse power water wheel. The current is carried from these generators up the cliff to the company's reduction plant and rolling mill located at the top of the cliff, the conductors used for this purpose consisting of aluminum bus-bars of a total cross-section of 146 square inches per leg. This is one of the heaviest bus-bar lines in the world. The reduction plant is contained in a large iron frame building in which are installed the necessary reduction pots together with machinery shop, pot lining equipment and large storage space for the reduced metal and for the ore from which it is made. Adjoining the reduction building is a new sheet mill in which the rolls and entire equipment are driven by electric motors taking power from the power house.

History seems to repeat itself rapidly in the aluminum business, as for the third time since the formation of the company it finds itself in possession of plants of much greater capacity than the markets will sustain. It is to be hoped, however, that history will not cease to repeat itself at this particular point and that eventually the market will expand to a point justifying the large expenditures which have been made, although the realization of this hope now appears to be somewhat distant.

ENGINEERS vs. METALLURGISTS.

Engineers generally, as users of metals, assume too readily that metallurgists know all their requirements and can satisfactorily meet them, and they often know nothing about the methods and difficulties of metallurgical work. On the other hand metallurgists too often consider their business to be only the furnishing of something which they imagine will meet the requirements of the order, often without knowing anything about the special uses to which the material is to be put. When unexpected failures occur each is inclined to think that the fault lies with the other, and so, beyond replacement, nothing is generally done towards determining or even investigating causes of failure and the consequent prevention of similar troubles in future. It is hoped that one result of the formation of the Institute of Metals will be the bringing together of engineers and metallurgists so that by their interchange of ideas and experiences mutual benefit and progress will result.—J. T. Milton—Institute of Metals.

Last year copper was mined in the Eastern States to the extent of 20,307,180 pounds valued at $4,061,436. Of lead 140,599 pounds were obtained having a value of $7,451, and zinc 22,748,193 pounds valued at $1,364,673.

Chili now imports metal bedsteads to the value of nearly $200,000 annually. Last year the United States only supplied $3,031 of this amount and England $165,199. The duty on iron and brass bedsteads is 35 per cent. on a valuation of from 14.6 cents United States gold per kilo of 2.2 pounds, including the packing case, etc., to 43.8 cents per kilo for iron bedsteads, and from 43.8 to 73 cents for brass bedsteads.

American Consul-General Thornwell Haynes, of Singapore, gives the output of tin for 1907 in the Malay States as 48,431 tons, consisting of 13,938 tons of block tin and 34,493 tons of tin ore, the former being less by 4,321 tons and the latter exceeding by 30,360 tons the output of the preceding year. The fluctuation in the price of tin was exceptionally great. The average local price for 1907 was $813.75 per ton compared with $855 in 1906.

THE MINTING OF SILVER COINS.

By Hubert D. Coleman.*

HUBERT D. COLEMAN.

In this work of coinage, we must start with proper material, and the basis of all this work is fine gold and fine silver. Of course we do receive bullion of all grades over the counter here, containing either or both gold and silver, usually with a copper base and pay for same, after making proper charges dependent upon the baseness of the deposit, either in cash or with a bar of fine gold or silver if the depositor so requests. The fixed charge of one dollar for bar making is the same on all weights of deposits below 1,200 ozs., though it may cost the government very much more than this amount to melt the larger deposits. Bars of 999 fine gold are ready for issuing in any weight by the melter and refiner, upon demand of the superintendent, through properly signed abstract sheets. We will now follow a silver half dollar through the different stages of its manufacture from the fine bullion refined in some large silver smelting works, and received at the mints in bars weighing between 1,000 and 1,200 ounces Troy. I did not select a standard dollar for the reason that this coin's popularity is waning and none have been coined by any of the mints since 1904.

WEIGHTS AND FINENESS.

This fine bullion, just mentioned, usually assays above 997 fine; this means that out of every 1,000 ozs. there are 997 ozs. of pure metal. Coin silver of the United States is 900 fine or standard; in England the coin silver is called sterling and assays 925 fine. The reduction of fineness then of this fine bullion by the addition of copper is about the first process or operation, after the bullion is received, weighed and checked. Calculations are made for each melt of silver, and the amount of pure copper is determined that will reduce this lot of metal to coin fineness. In this mint the gross weight of the metal in each silver ingot melt is about 8,500 ounces Troy, which will furnish a melt for the coiner, after being filed and properly sheared, of about 8,300 ounces; from which coin to the value of about 5,000 dollars is cut.

Before proceeding it might be well to explain the meaning and show the process for determining the standard weight. If a bar of silver weighs 1,000 ounces and the assay on same is 900 fine, there will be in this bar 900 fine and 1,000 standard ounces of silver, for

$$\frac{1000\times900}{900}=1000$$

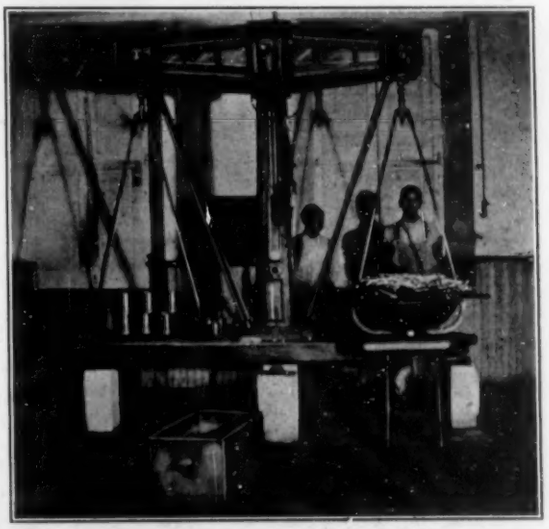
On this same principle: if a lot of five fine bars of silver bullion weigh 5,500 gross ounces and assay 999 fine (999 per thousand), there will be $.999\times5500=5494.50$ fine ounces and 5494.50 divided by $.900=6105$ standard ounces. Now if we wished to use the above five bars for an ingot melt, the approximate amount of copper to be added for reducing from 999 to 900 would be 10 per cent. of the standard weight, or 610.5 ounces of copper. This is not the methed used for determining the amount of copper but it is approximately correct when fine bars predominate in an ingot melt. In practice we must know the amount of copper oxidized in our furnaces and add sufficient to make good this loss. It is the aim of the melter and refiner to turn out metal in his department a trifle under 900 fine; this is done for the reason that the coiner's operations raise the fineness and the resultant coin is what we endeavor to make 900 fine. Of course, it is impossible to turn out all coin of exactly 900 fineness, so the government regulations provide for a variation of

$$.003\left[\frac{3}{1000}\right]$$

either above or below 900; but this they consider too great a variation and claim that in practice ingots should not be allowed to pass when they vary more than from .8985 to .901.

MELTING AND SAMPLING.

The melt now being prepared is fed into a crucible made of black lead and fire clay until the pot is filled, when it is covered and allowed to heat until sufficient metal is melted to allow another charge to be put in. The cover is not removed except for charging purposes until the entire metal goes down into a molten mass and is ready for agitation. This stirring is very necessary, for most silver alloys are very prone to segregate. One hundred stirs are given by three, sometimes four, men, making three or four hundred agitations in all, and then the metal is ready for pouring. Silver alloyed with copper in this proportion segregates to such an extent that even with all this mixing of the melted metal, instances are not wanting where the assays on the full melt do not conform to the requirements of uniformity and in consequence the assayer condemns the melt. In determining the fineness of an ingot melt, it is not chipped by the assayer; but instead, five samples called granulations are taken as the pouring progresses. These small samples of melted metal are poured into a cup containing ice water. This sudden cooling produces beautiful burst globules of light structure, which furnish proper and desirable samples from five different parts of the body of the melt, from which the assayer determines the true fineness. Besides keeping within the limit mentioned above, the fineness of these five granulations must be identical in order that the assayer "pass" the melt.



LARGEST SCALES IN THE MINT. CAPACITY, 10,000 OZS.

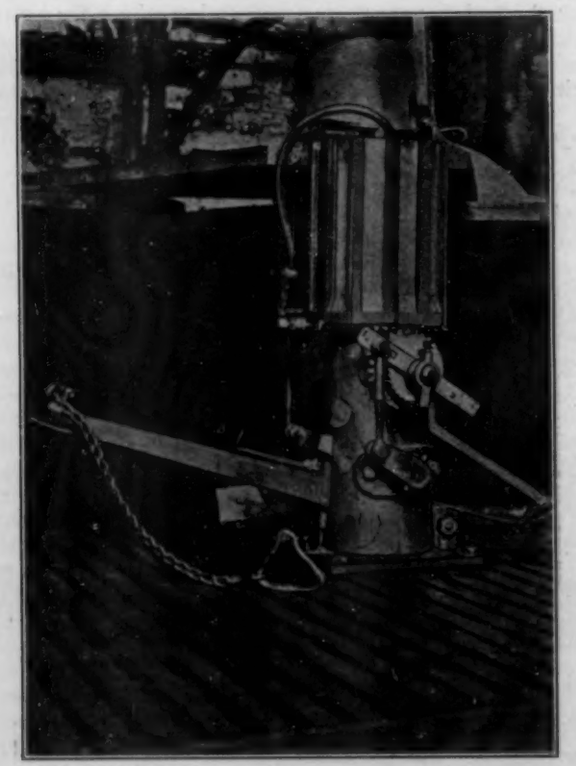
*Melter and refiner, U. S. Mint, New Orleans, La.

POURING AND MOULDING THE INGOTS.

In our work of silver ingot making, we use in this institution moulding machines. These machines are positive in action and in no ways complicated. A vertical spindle in a fixed base forms the axis about which a grooved cylinder is made to rotate, by means of gears and links, actuated by pressure delivered by the foot of the operator stepping heavily upon the end of a lever. The grooves in this cylinder form the incomplete moulds, and as each mould comes in position opposite the backing block, it is complete and ready to receive the contents of one dipping cup, which the pourer carefully allows to flow into the mould from the top end. After pouring each ingot the lever is pressed downwards, simultaneously rotating the cylinder and releasing the pressure of the backing block against the formed ingot, the next mould comes into place, and the moulded red hot bar is pulled out by another operator. These operations are carried on until the entire melt is poured and in the case of half-dollar ingots (bars 1¼"x1½"x12") about 220 result, which consumes about 4½ hours from the time the fire is lighted.

Our largest furnaces are used for this work, and coke exclusively is the fuel; these furnaces accommodate and we use a crucibe No. 200, which holds 8,500 ozs. of standard silver, allowing sufficient room for proper agitation of the melted mass.

To properly take off a melt with this machine, five men should be in their places as follows: One pouring, one operating machine, one pulling out and placing red hot ingots, and two conveying the melt to the acid bath for



INGOT MOLDING MACHINE.

whitening, and arranging. While it may be possible that it requires as much time to take off a melt with this machine as do the hand moulds, it cannot be denied that the work is rendered much less laborious by the adoption of this special ingot moulding machine.

(To be continued.)

A PRACTICAL BLACK NICKEL SOLUTION.

By R. H. Slater.

A great many platers have trouble producing a black nickel finish. I have a black nickel formula with which I have had good results, and which is black, not gray, as is the case with many formulae. It is also a black that will not fade or tarnish, for I have plated different articles and exposed them to various conditions and find they will hold their color. I have plated watches, buckles, builders' hardware, bag frames, etc. My solution holds 200 gallons, and to make it, I filled my tank half full of water, weighed out 175 lbs. of double nickel salts and dissolved them in boiling water. After the salts are dissolved and added to tank, the next step is to weigh out 12 lbs. of white arsenic also 20 lbs. of carbonate ammonia; boil these together in 14 gallons of water, and if the arsenic is not taken up add carbonate of ammonia until the arsenic is dissolved, then add to the large solution and stir thoroughly. The solution has a green color when the nickel has been added, but as soon as the arsenic and carbonate of ammonia are put in the solution becomes milky white. Use one carboy of ammonia, stir well, then add the cyanide; this is the one chemical which has to be added with care. Too much will injure the solution. The best method is to take a dip pot, fill it with cyanide and put in tank. Keeping it in motion until it is dissolved, continue to add cyanide until the white color disappears and becomes clear. Let the solution stand about 12 hours until it becomes cool.

I would advise the use of nickel anodes. The solution will stand about 8 to 9 on hydrometer. Use a current intensity of from 2 to 4 volts. In preparing the work for plating see that it is thoroughly clean, run through a white nickel for five minutes so that it has a light coat of nickel, then run into the black nickel. Judgment will have to be used while the work is in the black solution, as there is no time limit; at first the work will have a gray color, then a blue, which after a short time will become black, and the work will be ready to take out of the tank. Always turn off the current before taking out work, for this solution deposits very fast, and will burn the work. See that the work is run through clean water and thoroughly dried out in sawdust, then scratch brushed. It is hardly necessary to lacquer, but I would advise lacquering in some class of goods, that would depend a great deal on the plater's judgment. Following are the amounts to one gallon:

¾ lb. Double Nickel Salts.
2 oz. White Arsenic.
2 oz. Carbonate Ammonia.
1 lb. ffff. Ammonia.
Cyanide sufficient to clear up the solution.

After a two months steady run of this 200 gallon solution, there have been added from time to time 26 lbs. nickel salts, 1½ lb. arsenic, 2 lbs. carbonate of ammonia. Aside from a black scum which formed on the anodes, making a thorough scouring necessary, the solution has given no trouble whatever.

METAL PRODUCTION IN ONTARIO.

American Consul-General Geo. H. Sholts, of Sault Ste. Marie, furnishes the following as to the production of the cobalt mines of Ontario for 1907:

Nickel	$ 1,174
Cobalt	104,426
Arsenic	40,105
Silver	6,155,291
Total	$6,301,095

THE VALUE OF A METALLURGICAL CHEMIST TO A BRASS FOUNDRY.

W. M. CORSE.*

The advent of the chemist into the brass foundry field has only been recent, and many foundrymen are asking the question, "Will it pay us to have a chemist?" To answer this question is the purpose of this article.

Let us first consider what conditions exist in a foundry that apparently demand chemical control, judging from parallel conditions in other industries.

W. M. CORSE.

TESTING RAW MATERIALS.

It is fast becoming good practice, and therefore good business, to test all incoming raw materials in the laboratory before allowing them to be used by the various departments. These tests may be simple or complicated, as the case may demand. They may be chemical or physical or a combination of the two. Many concerns have learned by testing over a period of years just what the important test is, thereby eliminating the unimportant one and saving a lot of time in consequence. Among the materials tested by some concerns may be mentioned: coal and coke, lubricating oils, paint and varnish, raw chemicals, pig iron and metals. The results of these tests may be used by the purchasing department in buying materials according to specifications and to help select from a number of kinds offered the one best adapted for the purpose. These tests also tell the purchasing agent when he is getting the most for the money.

Applying this to the brass foundry, what do we find? We have the metals such as copper, tin, lead, spelter, ingot brass, scrap brass, and possibly antimony. Copper can be analyzed for its purity very accurately, and the impurities can be determined if the requirements of the metals are severe. For instance, it is sometimes necessary to determine the amount of arsenic present, as this is a common impurity in some brands of copper.

Tin is a metal comparatively easy to procure in a high state of purity, but some brands, such as Bolivian or Chinese, may have to be tested before they can be used.

Lead and spelter both need attention occasionally, if not regularly.

Ingot brass is generally bought on close specifications, and must be analyzed if the purchaser is to know if the material comes up to the requirements. Scrap brass can seldom be tested to advantage on account of its nature. The chance of the introduction of harmful metals into some classes of castings is making the use of scrap much less preferable to that of ingot brass, if the latter be bought on chemical analysis. Then we have, in addition to the metals, such materials as coke, molding sand, core sand, fuel oil and crucibles. Coke may be tested for sulfur and ash, and also in a practical way to see if one charge will melt a pot of metal without "coking up." The amount of coke used to every 100 pounds of metal melted should also be determined. One may ask why a chemist is necessary to make such tests as the last one mentioned? I would say that he is not necessary, for, as a general thing, the average foundryman may carry out such a test satisfactorily, but he is the exception if he can keep a proper record of it over a period of days or weeks, and draw the proper conclusions. As a rule, the chemist is the only technically educated man around the department, and from the nature of his training is better fitted to carry on tests of this character than anyone else.

Molding and core sands should be tested for fineness and clay content. A test such as suggested by Heinrich Ries of Cornell University,† for porosity and permeability would add much to our knowledge of what might be expected of the sand in practice. Fuel oil may be tested for specific gravity: a fractional distillation will give an idea of its value in some cases.

Crucibes may well be tested in a practical way, for this item of expense is large in most brass foundries, and proper attention to their treatment will undoubtedly lead to many economies. A record of the performance of different crucibles is the key to the solution of this question. Mr. Dudley A. Johnson's admirable paper‡ on "Prolonging the Life of a Crucible" gives many valuable suggestions on this subject.

Other materials will undoubtedly suggest themselves as being fit subjects for inspection, as the ones mentioned are only those that are the most important.

TESTING FOUNDRY REFUSE.

All foundries make a certain amount of refuse, part of which has a marketable value. As the majority of foundries crush and wash their own ashes, it is hardly necessary to consider this material as salable at this time. Those foundries that do not have a crusher have only to have one bitter experience with a metal dealer of a certain caliber in order to make them change their minds very suddenly. Tailings from a crusher, such as a Hill or Moussette, should be tested for copper contents. This information will enable the foundryman to sell his material intelligently. It is surprising how many foundrymen seem to forget about the existence of a chemist when they sell refuse from the foundry. There are generally other materials which contain copper or brass that might properly be sold to a smelter; for instance, ashes from a rubbish or garbage furnace, floor sweepings from the emery wheels and tailings from a magnetic separator. All such materials will bring a higher price if the foundryman can guarantee their copper contents, but how can he do this without the chemist's assistance?

TESTING THE FOUNDRY OUTPUT.

The average foundryman is very particular about weighing his new metal for his charges, in order to get the exact proportions, but he often neglects to take into account the composition of his gates and sprues, which are a large proportion of these same charges. How can he get the composition of the gates and sprues? He can have an analysis made regularly of his metal coming from the furnaces, from which he can calculate the number of pounds of copper, tin, lead and zinc in each lot of gates and sprues weighed. This answer involves the chemist again. To anyone who has not figured this out for himself, it is surprising how much money can be saved by thus controlling the composition of the metal. A compar-

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*Assistant Manager Michigan Smelting & Refining Co.; Secretary American Brass Founders' Association.

†Trans. American Brass Founders' Association, 1908, p. 17; METAL INDUSTRY, November and December, 1908.

‡Trans. American Brass Founders' Association, 1908, p. 40; METAL INDUSTRY, October, 1908.

atively small change in the composition of the metal means a fraction of a cent a pound, which, figured on the total melt, may easily run into hundreds of dollars for the month. In addition to the direct money saving, a uniform composition of the metal generally means uniform castings as regards appearance, mechanical properties and ability to withstand water or steam pressure. All of these are decided advantages. In addition to the analysis of the metal coming from the furnaces, it is often advantageous to analyze the turnings from the machine shop where several different mixtures are being used in the castings.

It is difficult to keep the turnings from the different mixtures separate, and it is often better to mix them and get the average composition of the whole.

I think I have made it sufficiently clear how a chemist can be used to advantage in any brass foundry. If any difficulty is experienced in keeping him busy on chemical work, his time may be filled in with clerical work in the foundry office. The probable outcome will be that as his results are used, his spare time for clerical work will be decreased. In the case of a small foundry it may be better to employ the services of a central testing laboratory; for there you get expert advice in addition to chemical work. Many brass foundries are large enough to employ chemists, did they but know how to use them. I hope that my suggestion to use the chemist as a clerk for a part of the time at first may help some to get started in the right direction.

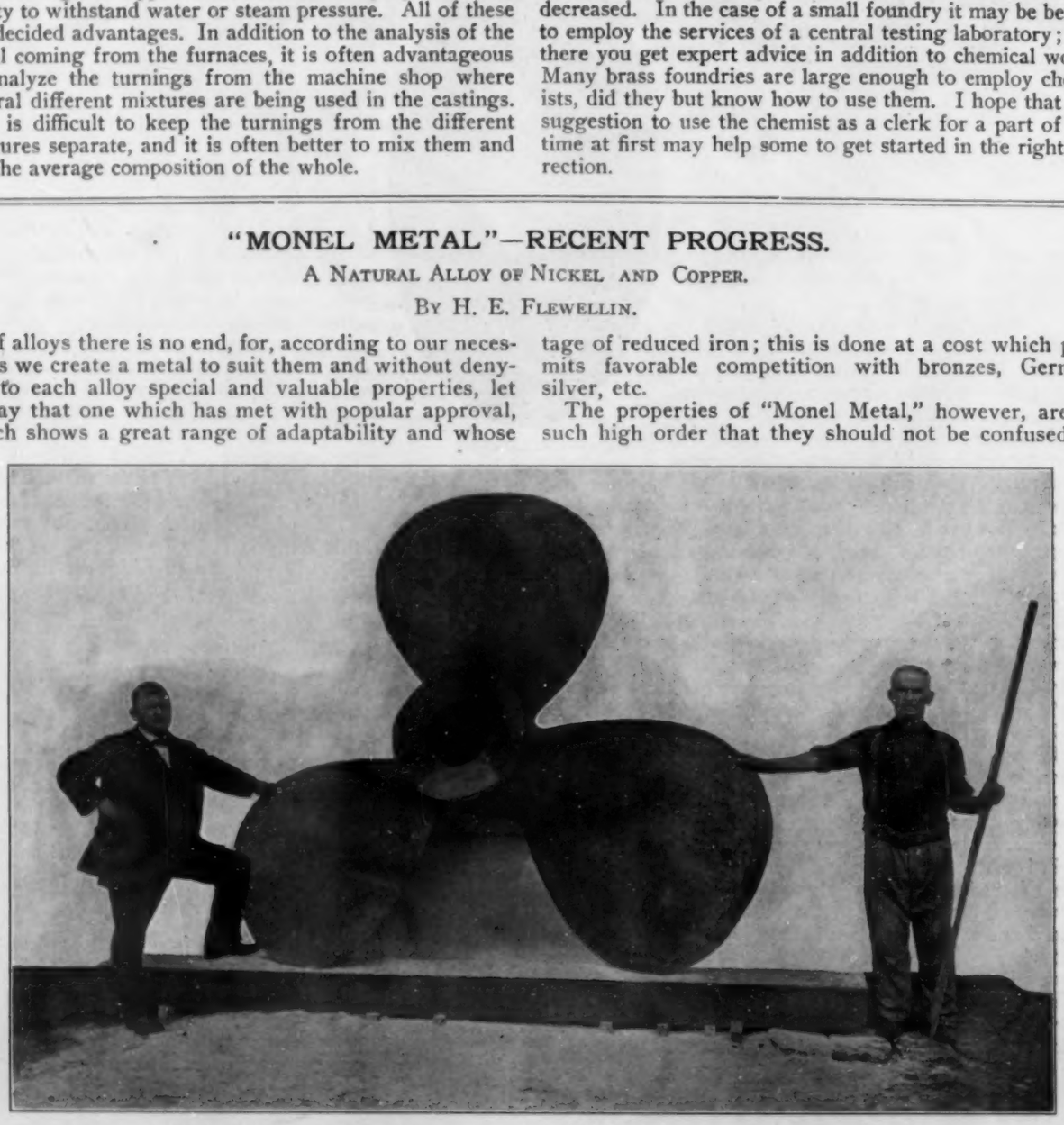
"MONEL METAL"—RECENT PROGRESS.

A Natural Alloy of Nickel and Copper.

By H. E. Flewellin.

Of alloys there is no end, for, according to our necessities we create a metal to suit them and without denying to each alloy special and valuable properties, let us say that one which has met with popular approval, which shows a great range of adaptability and whose field of usefulness is being rapidly enlarged is "Monel Metal," a natural alloy of nickel and copper; composed approximately of 70 per cent. nickel, 1½ per cent. iron and the balance copper. In smelting and refining the ore from which "Monel Metal" is made, the nickel and copper are not extracted or separated and, therefore, appear in the finished alloy in the same relative proportions. As a result we have a metal that is tough, strong, as non-corrosive as pure nickel, the same in appearance, and whereas nickel as a pure metal is relatively expensive owing to the difficulty of isolating it, the treatment of this ore consists merely in eliminating the impurities, excepting a small percentage of reduced iron; this is done at a cost which permits favorable competition with bronzes, German silver, etc.

The properties of "Monel Metal," however, are of such high order that they should not be confused or compared with the numerous white metals of German or nickel silver, which are the results of varying percentages of nickel, copper, zinc, lead, tin, etc. In all these alloys, nickel is the important factor and usually the combination is employed for color, hardness, resistance to certain chemical action, etc., though the manufacture and treatment of such alloys is too well known to call for special comment. The purpose of this article is to present briefly in systematic form the properties and applications of "Monel Metal" which have been investigated and recorded.



PROPELLER BLADE S. S. CREOLE, CAST IN ONE PIECE OF MONEL METAL.

"Monel Metal" has practically the same specific gravity as copper and melts at (1360° C.) 2480° F. It

is ideally suited for any castings which are subjected to severe strain and shock, and which yet must be of a metal that will not corrode. The accompanying cut shows one of two propeller wheels made of "Monel Metal," in one piece instead of casting the blades and hubs separately and bolting them together. These wheels are made from metal having the following physical properties:

ILLUSTRATION.

Wheels for S-S "Creole"..Tensile strength...77,500 lbs. per sq. in.
Diameter, 9' 6".....Elastic limit.....36,000 lbs. per sq. in.
Weight, 6,500 lbs.....Elong. 2".....28.0%
Red. of area.....29.50%

This emphasizes the possibility of reducing weight and still obtaining a metal stronger and stiffer than now generally used. As further applications in castings, I may cite rudders, desk fittings, center boards, water ends of pumps, valves, plumbing fixtures, pickling apparatus, jig plates, harness mountings, etc.

"Monel Metal" is readily rolled into plates and sheets and as an important field for competition with copper may be mentioned roofing—here the high resistance to acids, weather conditions, etc., coupled with its low coefficient of expansion (.00001375 against copper .00001666) ductility and flexibility makes it extremely attractive. The new Pennsylvania Terminal in New York City, the largest in the world, is being roofed with this metal, which was adopted after exhaustive tests by the railroad engineers.

COMPARATIVE TESTS.

½" PLATES—STANDARD TEST SPECIMENS.

	"Monel Metal"	Soft Steel	Copper
Tensile Strength..	90,000 lbs.	60,000 lbs.	34,000 lbs.
Elastic Limit	45,000 lbs.	30,000 lbs.	18,000 lbs.
Elong. 2 in.....	30.0%	35.0%	52.0%
Reduction of Area...	60.0%	35.0%	57.0%

FURTHER APPLICATIONS OF HOT ROLLED SHEETS.

Ship plates, sheathing, roofing, gutters, leaders, skylights, sash chains, ventilators, drip-pans, mine screens, coal chutes, smoke stacks, gaskets, cut nails, tacks, etc.

COLD ROLLED SHEETS.

Cooking utensils, milk cans, candy molds, hospital equipment, coffins, watch cases, cigarette cases, jewelers' stock, desk fittings, knives, forks, spoons, coin blanks, reflectors.

PHYSICAL PROPERTIES OF CASTINGS.

	Grade "B"	Grade "C"	Grade "D"
Tensile Strength..	85,000 lbs.	65,000 lbs.	70,000 lbs.
Elastic Limit	40,000 lbs.	25,000 lbs.	30,000 lbs.
Elong. 2 in.	10.0%	30.0%	20.0%
Reduction of Area..	14.0%	35.0%	25.0%

BARS, RODS AND WIRE.

Shafts, piston rods, valve stems, bolts and nuts, horse bits, resistance wire, motor cycle spokes, rustless screens, nails, screws, rivets, etc.

A prominent manufacturer of bolts and nuts has just completed 144 tests on "Monel Metal" bolts and steel bolts and says:

"If the bolt heads are well formed, the thickness of the head could be made 5-16 in."

A. L. A. M. Standard thread is from 10 per cent. to 20 per cent. stronger than U. S. Standard thread.

Rolled thread is from 5 per cent. to 10 per cent. stronger than cut thread of the same size and style.

The Monel Metal bolts or studs elongate before breaking about the same as steel bolts of the same size.

"The A. L. A. M. thread in a steel bolt is the weakest point. It will strip every time. It is not so in the Monel bolt. This is a great advantage for the Monel bolt because the bolt will stand tightening and loosening and still be strong enough. ½-in. Monel bolts are from 30 per cent. to 35 per cent. stronger than steel bolts of the same style and size. ⅜-in. Monel bolts are 60 per cent. stronger than steel bolts of the same style and size."

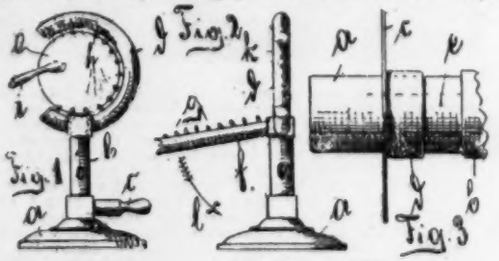
Hot Rolled 1" Bars	"Monel Metal"	Government Specifications Phos. Bronze	Government Specifications Tobin Bronze
Tensile strength...	108,750-110,000	40,000	60,000 lbs.
Elastic limit.....	80,000-104,000	.....	30,000
Elong. 2".....	27.0- 13.5	15% to 30%	30.0%
Reduction of area.	51.1- 43.7	.....	.....

A careful perusal of the above quoted figures will show at a glance the many different properties of this metal, and perhaps suggest to the reader many applications in which it might excel. This metal has been on the market but a short time and up to date its field of usefulness has been continuously and steadily enlarging and there is every prospect that it will gain further favor as those connected with the metal industries become more generally and intimately acquainted with "Monel Metal."

WARMING ZINC SHEETS FOR SPINNING.

While brass, copper, silver, gold, aluminum and some other metals may be drawn and spun in a cold state, zinc, which is much softer than any of those mentioned, requires to be kept warm during the spinning process. The warming takes time and saves money, and as it cannot be avoided, the only thing to do is to facilitate the process so as to reduce the cost and increase the production within a given time.

The usual procedure is for the workman to lay one or two of the zinc sheets to be spun on a heavy sheet-iron plate, which is heated from below by any convenient means; one at a time the sheets, if previously perforated in the centre, are spitted on the pressure screw and put in the chuck. But as during the rapid rotation of the sheet in spinning it gets cold, it is usually necessary to have under the chuck a flame which keeps the piece equally warm at all points of the circumference of the circle being worked. As, however, the spinning proceeds from the center to



BURNER. SHEET-HOLDERS.

the circumference of the sheet, the flame must be made to follow in a radial line the motion of the forming-iron, and this the operator effects by shoving along it radially by means of the forming-iron itself. The finished article being removed from the chuck, the warming flame is brought to its original central position and the process is repeated, with its usual, inevitable, time-robbing accompaniment. This method has further the disadvantage that but few plates can be warmed at a time, and that even with this precaution, a sheet often gets melted.

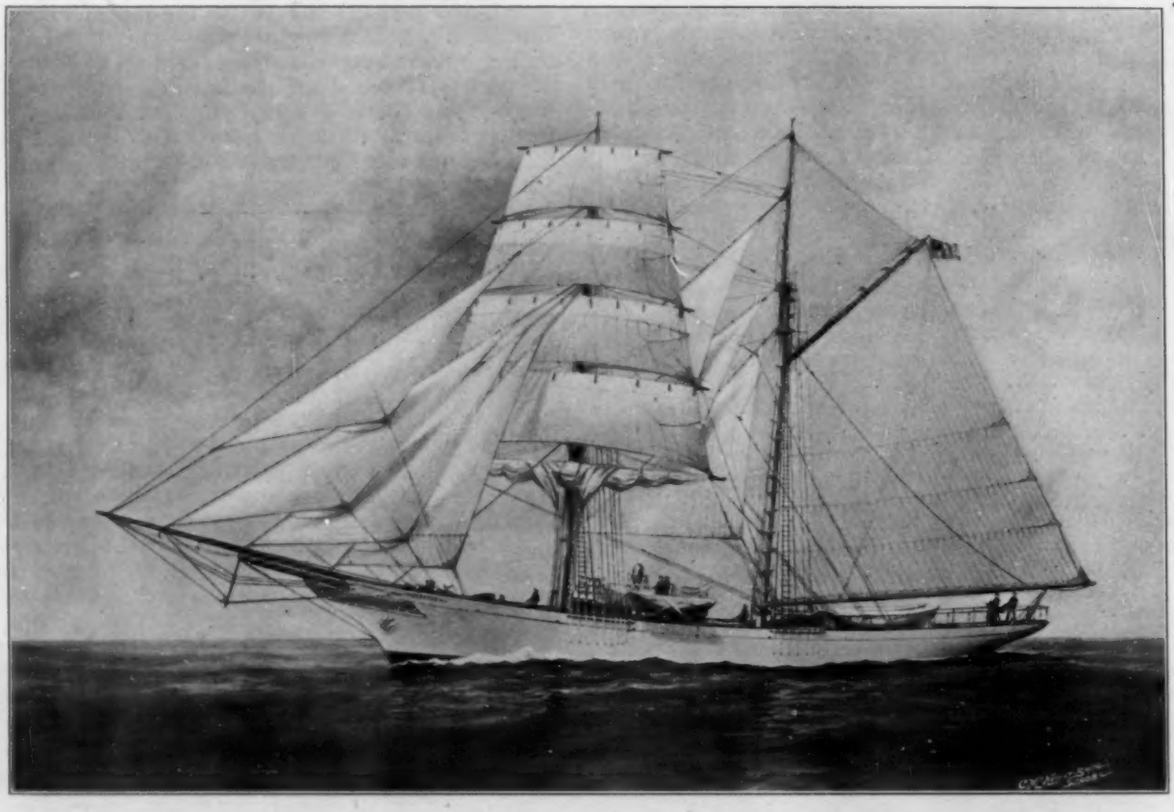
Where the sheet to be spun has no central hole,

the process is still less convenient, as in this case it is necessary to grasp the sheet with the tongs. Further, where the sheets are not previously centered, there is still more inconvenience, as the centering process takes time and permits cooling. This necessitates rewarming the sheet while in the chuck, which causes delay, even where one man serves two lathes, and, of course, reduces the hourly output per machine. In order to lessen the above-mentioned loss of time and material, an apparatus is illustrated in the Deutsche Metall-Industrie. It may be made by any mechanic, and costs but little.

With reference to the annexed figures; *a* is the stand of the Bunsen burner, *b*; *c* is the nozzle for the attachment of the gas tube, *d* a ring of gas pipe, broken at one side to permit handling the sheet and working it by the forming-iron, *i*; *h* are gas jets directed radially inwardly. Besides the ring-shaped set of jets coming from *h*, there is a pipe *f*, with a hinge permitting it to be adjusted in the direction of the arrow *l*. The ring *d* is easily removed and replaced, so that one of the proper size may be used for each sheet to be spun. As the plate is surrounded for about three-fourths of its circumference by the blue heating flames, it takes but little time to get to work thereon, and the spinner has the certainty that the work will not get cold under the forming process, and that he need lose no time in heating after centering.

Fig. 3 shows the manner of holding sheets that are neither cut out in the middle nor even centered. The bored-out mandrel, or rather clamping-piece, *a*, sets over the mandrel or lathe-center shown in dotted lines The centering disk *c* must correspond in diameter with the sheet to be spun. The latter is held against the piece *c* and the centering disc is drawn to the edge of the latter, so that the two parts exactly correspond concentrically. The piece *a* is then pressed against the chuck, and the centering disc drawn back by the right. All these manipulations are carried out in a few seconds, and the work of spinning can then proceed without interruption.

AN IRONLESS VESSEL, "THE CARNEGIE," BUILT OF WOOD AND METALS.



The accompanying picture of a trim brigantine-rigged yacht under sail represents a vessel to be constructed without iron or steel or any other magnetic metal. All of the metal parts even to the auxiliary engine and crank shaft are to be constructed of the non-ferrous metals and alloys. This unique craft has been ordered by the Carnegie Institution, of Washington, D. C., from the Tebo Yacht Basin Company, Brooklyn, N. Y. She will be known as the magnetic survey yacht Carnegie and will have an over-all measurement of 155 feet 6 inches, a beam of 33 feet, a mean draught of 12 feet 7 inches, and a displacement of 568 tons. She will cost approximately $125,000. The hull will be constructed of wood. The fastenings are to be of copper and Tobin bronze bolts and composition spikes. Every nail, bar and brace, all of the metal work on the spars and rigging will be made from either bronze or copper, likewise the anchors. The auxiliary power plant consisting of a 6 cylinder internal combustion engine capable of developing 125 indicated horse power will be built of bronze, also the shafting and propeller. The observation room and circular observatories, located on the main deck amidships will be constructed of bronze frame work and plate glass, and arranged so as to permit, whenever possible, sighting on celestial and terrestial objects in magnetic declination work. The first voyage of the Carnegie will be to the North, visiting Hudson Bay and Greenland. The second cruise will be to the South seas.

In a review of the mining situation in the Urals, the Ekaterinburg correspondent of the Novoe Vremia deplores the indifferent technical efficiency of the mining enterprises there, and enumerates the various countries that are taking possession of Russia's mineral wealth.

PLANT USED IN THE MANUFACTURE OF TUBES.*

By W. H. A. Robertson.

The manufacture of solid drawn tubes can be divided under two heads, (1) the production of the shell, (2) drawing the shell to finished size.

The latter operation is universally carried out by cold drawing through dies on chain-operated draw benches.

For the question of manufacture, it is the main effort to deliver the shell to the draw benches, as near as possible to the size of the finished tube, consistent with the amount of work which has to be done on the material, in order to obtain the requisite tests and smoothness of surface. This is, therefore, the reason that great attention has been paid to the first operation, the second having been neglected somewhat. The difficulties to be overcome are many and serious: the shell must be perfectly concentric, and any eccentricity becomes exaggerated in the cold drawing; the surface must be quite smooth, as defects will not draw out; the inside of the shell must be quite free from flaws, the same remarks applying; each shell should be exactly similar in bore and outside diameter, or trouble is caused in drawing.

It will readily be understood that these difficulties are formidable when it is required to produce in bulk and with the minimum amount of scrap and wasted shells The more general methods of producing shells which have been adopted are briefly as follows:—

DRILLING AND ROLLING.

The old method was very crude, and consisted of casting heavy solid cylinders, the size and weight depending upon the tubes required. The casting is made in an ordinary cast-iron mould, and after a preliminary rolling to reduce to suitable outside diameter, the cylinder is bored out in a boring machine, this operation being of the highest importance, as if the bore is not entirely concentric with the outside diameter, eccentric tubes will result. The difficulty attending this operation is due to the material not being entirely homogeneous, blow holes and hard pieces tend to throw the drill (which is of necessity overhung) out of true. Ordinary spoon or diamond-pointed drills are used. After this operation the shell is rolled down by passing over mandrils, between grooves cut in the rolls, the grooves and mandrils being proportioned to give a gradual reduction in diameter and wall, until a size is obtained that can be dealt with efficiently on the tube-draw benches.

CASTING.

Some metals can be cast on a core, or in some cases will only allow of this method. In such instances, the metal is poured into a cast-iron chill, having the bore machined out and arranged to take split or solid dies to hold a core in position. The size of the bore of the chill, or mould, and of the core, are varied in accordance with requirements, but the limit of the thickness of the wall of casting is decided by the ability to produce sound castings, and for this reason manufacturers differ in their opinions as to the most efficient dimensions. The process, although apparently simple, is not an ideal one, as the many minor details, which together are of the greatest importance, cause endless trouble.

MANNESMAN PROCESS.

This process, which was first introduced about 25 years ago, consists in passing a heated cylindrical billet through conoidal rolls arranged with axes parallel to each other, but inclined in opposite directions. The rolls are arranged so that a reduction is given to the billet of about 40 per cent., this reduction being such that an internal rupture is set up along the centre of the billet. The original drawings of Messrs. Mannesman show the result obtained. It is, however, necessary to produce the shell having a clean and smooth bore; this result is obtained by allowing the billet to be forced over the mandril, which acts upon the internal surface in such a way as to produce the required surface. This process is very remakable, and is one which has an exceedingly interesting explanation:—

It is known that if a round bar is hammered all round its circumference, by successive blows, the centre is ruptured. It can easily be imagined that with successive blows all round the periphery the consequent rupture is more or less regular. This, then, is the basis of the Mannesman process, which has two rolls which give rapidly recurring blows to the bar or billet, while at the same time, by reason of the rolls being set at an angle to each other, the billet is fed forward, thus causing the internal rupture through its whole length, and producing the shell required. The rupture is controlled by the angularity of the rolls, or, in other words, by the speed of the billet through the rolls and by the reduction made on the billet. It will be clear that if the reduction and the consequent rupture is too great, the billet will be squeezed into an oval, or such a shape that the rolls will not be able to revolve the billet. In conclusion, it may be stated that it is possible to produce a shell of larger or smaller diameter than the billet from which it is made, as required.

PUNCHING PROCESS.

This method consists in forcing a mandril through a heated billet contained in a suitable die or casing. There are many adaptations of this process in use, but the two processes from which they have their initiation are those propounded by Robertson and Ehrhardt. The flow of metals has been discussed very thoroughly at various times, but no universal opinion has yet been formed as to the advantage of radial or longitudinal flow, and for this reason both methods are in use. In the longitudinal flow method a mandril is forced through a heated cylindrical billet contained in a die which does not allow of radial flow or expansion, consequently the displaced metal flows longitudinally along the die.

In the radial flow method a heated rectangular or polygonal billet is placed in a round die, and a mandril is forced through as in the method just described, but the displaced metal flows radially to the bore of the die, which is proportioned so that no longitudinal flow takes place.

ELMORE'S PROCESS.

In this method, which has excited considerable interest among users and manufacturers, a mandril is surrounded by unrefined Chili bars arranged upon strong supports in a depositing tank of copper sulphate; the copper is decomposed and deposited in the form of pure copper upon the revolving mandril, leaving the copper in the form of a tube of any required thickness. When the required thickness is obtained the tube and mandril are subjected to the action of hot air and steam, and the greater expansion of the copper allows the mandril to be withdrawn. It is necessary in this process to employ a burnisher in order to increase the density of the deposited copper, and this is done by pressing a square piece of agate upon the deposited surface, the burnisher

*Paper read before the Institute of Metals.

being traversed from one end of the tube to the other by means of a traversing screw. The speeds of the revolving mandril and traversing burnisher are arranged so as to ensure the whole of the deposited surface being acted on.

CENTRIFUGAL PROCESS.

No doubt the members have seen in detail this process, as described by Mr. Cowper-Coles in his recent paper before the Institution of Mechanical Engineers, but it may be of interest to state here that Mr. Cowper-Coles gives the following results as tests made on the deposited tube, before drawing:

Diameter outside	1.123 in.
Thickness of metal (mean)..	.063 in.
Length	4.94
Wt. per ft.....	.814
Subjected to a pressure.....	3,000 lbs. per sq. in.
Maximum stress	17 tons.

This process, which is described as the centrifugal process, differs from other electric depositing by reason of the great speed and the current density. As much as 200 amperes per square foot can be employed, and it is stated that 500 amperes per square foot, with higher speeds, can be used.

For further details of this process I would refer you to the above-mentioned paper.

Having described in the preceding pages the most generally-employed methods of producing the shell, a brief attempt will be made to give an idea of the existing practice in dealing with the shell in the drawing mill. It may be as well to state that the operations described are cold drawing, and not hot.

The object aimed at in cold drawing is to reduce the shell to the required size, surface and strength in the least number of draws or reductions.

EXTRUSION PROCESS.

This process is, I believe, not yet satisfactorily adapted for tubing, but it may be of interest to give an outline of its principle. The metal is, after being cast, heated to the required temperature, and placed in the chamber of the extrusion machine; an hydraulic ram is put in operation and forces the metal, which is plastic, out of an orifice in the die head, which is of the required shape. In producing tubes a similar arrangement of dies is shown to that in use in the ordinary lead tube process. This process is used very successfully in producing rods and section; it, however, has the disadvantage that only certain mixtures of metals can be extruded. The general brass mixture has the proportion Cu 55 per cent., Zn 45 per cent. (In American practice the extrusion mixtures now in use range from 60% to 66% Cu and 40% to 34% Zn with varying amounts of lead from 1½% to 4%. Ed.)

(To be continued.)

Siemens and Halske, of Berlin, have obtained a German patent (No. 197,861) on a process of manufacturing electric incandescent filaments from tungsten or its alloys, consisting in squirting, and reducing by the electric current, colloidal water solutions of tungsten compounds. Only so much carbon is added as will be entirely removed during the treatment with the electric current; any excess of reducible metallic compounds being subsequently reduced by other means.

Brass solutions are supposed to be the most difficult solutions to operate, but this should not be. The frequent cause of trouble in a brass solution is too much zinc, cyanide or ammonia.

SALT WATER GOLD PLATING SOLUTION.

By William Schneider.

WILLIAM SCHNEIDER.

The greater part of the reading matter presented to the plating public at the present time is of a purely theoretical nature. While I do not deny that this theory has its many uses and is of great advantage to the profession, I maintain that in very many instances it is far more advantageous to resort to practical means and work towards better results from the standpoint of practical experience, rather than entirely from theory, in the trade. The subject which I am about to discuss could very well be treated theoretically, but I think that it will be of far more interest and advantage to my readers if I confine myself to the practical side.

The subject of salt water gold plating is one of extreme importance of which very little has been written. I have long practiced and been an advocate of this method and hope herein to bring out some of the advantages which it possesses over the many other methods of gold plating now most commonly used, as, for example, the "dip" or "slush gilding," cyanide work and various other means where a dynamo is necessary.

The first consideration of the advantages of this solution should be as to the quality of the work turned out. It is here that the superiority of this simpler and improved method is most evident. The greatest demand that the manufacturer makes upon the plater is for uniformity. Uniformity of color is absolutely essential and besides this an approximate standard in the weight of gold applied to any given amount of work must be maintained. It is in this important feature that those processes now commonly used are to a great extent lacking and here the salt water solution shows itself particularly efficient. Most platers will admit that in solutions which require a dynamo and constant additions of cyanide, it is very difficult to maintain any degree of uniformity for large quantities of work. This is probably due to the varying strengths of the currents and chemicals necessary. In the method which I am advocating, these difficulties are entirely obviated and I have found in the several years which I have made use of it that the quality and uniformity of the work far excels that resulting from the use of the more complicated means.

The difficulties which one encounters in the use of the salt water method are so few and of such a trivial nature as to hardly require mention. The simplicity of the process speaks for itself. The apparatus once set up, it is only necessary to put in the required materials and see that the temperature of the solution is maintained at about 150 deg. to 160 deg. F. No further interference on the part of the plater is necessary and the solution will act uniformly until the gold is entirely worked out. (This allowing the gold to be worked out is not advisable, however, and I have found it better to leave a working foundation of about one-third of the total amount of gold. This one-third is used merely as a convenience and is not wasted.)

Let us next consider the convenience and safety of this method. In the ordinary methods, aside from the unnecessary work involved in their operation, the plater is

really in danger from the injurious gases arising from the solution and, in case he has any abrasions or cuts on his hands, is constantly open to the contraction of "cyanide poisoning"—a malady far too prevalent among gold platers. In using the salt water solution this danger is eliminated. There are no fumes generated in the solution and the total absence of cyanide does away with all fear of its poisonous effects.

From an economic standpoint the salt water method is far superior to any of the others. It is very much cheaper and when once in working order costs very little to maintain. The only real expense to be considered is that of setting up the solution. This expense can be judged from the following example—to set up a ten gallon gold solution for the salt water process, the only apparatus required would be: one copper kettle (diameter about 15 inches); about four coils of ⅜-inch copper steam pipe with an exhaust; a sheet of zinc (¼ inch thick, about 38 inches long by 15 inches wide), which is set up in the copper kettle to partially surround a ten gallon porous earthenware jar (flower pottery); to this zinc sheet is riveted a copper rod half an inch thick and about 18 inches long. In the kettle is placed four pounds of rock salt and two pounds of salammoniac, which, with the zinc, copper and hot water, forms a galvanic battery. I have not mentioned the exact cost because these naturally vary for particular cases. The fact is that the setting up is not any more costly, probably very much less so, than in using the regular gold solution.

Let us now consider the cost of maintaining the salt water solution as compared with the others. The fact that no cyanide is necessary has a great advantage in the matter of cost as well as in safety. The effect that cyanide has on gold is known to all platers, and the high price at which it is sold, together with the large amounts of it necessary for satisfactory plating, make it a costly item in the use of other methods. No gold or platinum anode is necessary in the salt water method. The apparatus once set up requires very little renovating and replenishing and the cost of the chemicals necessary to carry on plating work in this solution is comparatively so trivial as to be negligible. I have found from actual practice that gold plating work can be done by means of the salt water solution at about half the cost of any other method.

I am not attempting to introduce this as a new method, for it is one which has long been used by some of the best and most advanced platers now in the trade. It is equally useful to the small and the large manufacturer, and in every case that has been brought to my notice this method has proven eminently satisfactory, cheaper and more efficient.

To prepare a ten-gallon solution: 30 dwts. of fine gold are prepared as a fulminate in the usual manner. Then place in a five-gallon agate can the following chemicals:

Sodium Carbonate	20 oz.
Sodium Phosphate	10 oz.
Sodium Sulphite	4 oz.
Potassium Ferrocyanide	4 oz.

This mixture is dissolved in water and brought to a boil. The fulminate is now added and the solution is left to boil for one hour or more with frequent stirring. The boiling solution is then poured into the earthenware jar (described above), and more hot water is added to bring the solution in the jar to the level of the outside (battery) solution. The temperature of this must be kept about the same and, if it becomes cooled while not in use, part of the solution must be taken out and again boiled and agitated for 15 minutes.

A GOOD UNIFORM ROSE GOLD COLOR.

By Oscar A. Hillman.

As a large number of colorers of jewelry are having a great deal of trouble in producing a good uniform rose gold color, and are finding their various experiments not only futile, but attended with heavy loss, a few words concerning this finish may not be inopportune. While every colorer will have to be guided to a certain extent by the orders from his customers as to the shade of color and amount of gold deposited, a brief description of the process used in the production of the finish may help to overcome apparently insurmountable difficulties.

It should always be remembered that no matter how heavy the deposit of metal is put on an article that is scratched or marred in any way, the defects will be perfectly reproduced. In order to have a perfect article after coloring, it must be free from any blemish before coloring.

While most books on electro disposition advise a heavy copper deposit first in order to obtain a heavy smut on the article before coloring with gold, it should only be used on the cheapest grade of goods, or if the articles have been soft soldered, all other goods such as brass, copper, silver, rolled plate and gold receiving a fine satin finish, sand blast or matt dip according to the grade of the articles and the finish desired.

If the copper smut is to be used, instead of a heavy copper deposit, give the articles a light coat of copper, then dip in hydrochloric acid for about 30 seconds and copper lightly again, when the articles will have a fine uniform dead surface ready for the final gold color. The copper solution that is considered best for the purpose consists of:

Copper Carbonate	4 oz. per gal.
Potassium Cyanide	5 oz. " "
26° Ammonia	4 oz. " "

Use the solution at about 150 deg. to 180 deg. F., with a voltage of not less than 8 amperage according to quantity of work, in general about 4 amperes per square inch of cathode surface.

The reason for using a quick light deposit in place of a heavy one is to overcome as much as possible the liability of the work becoming burned in the copper solution or receiving a coarse granular surface.

All work that has been satin finished, sand blasted, or matt dipped is ready for the gold solution after the usual washing off and dip in potash and should be colored at once before it has a chance to tarnish. The gold solution to be used with an eight-volt dynamo should contain per gallon:

Potassium Cyanide	4 oz.
24K Gold	3 dwt.

If it is found that the shade is too light, add carbonate of potash until dark enough, and if, after working for some time, the shade is too dark, add phosphate of soda, which will give a heavy smut of a light color.

After obtaining a good satisfactory smut on the articles they should always be toned off on the high lights and given a quick color again, after which they may be burnished on the extreme high lights, always taking care that the burnisher does not spoil the beauty of the die work by hard pressure. A few general rules in conclusion are: Always have the work and solutions clear and see that the solutions are maintained at their original strength and are not impoverished by over working or evaporation. Always keep the work in motion while in the copper and gold solutions to prevent burning at the lines of least resistance, e. g., the points on the work nearest the anode.

Always use long and narrow anodes if possible. Never add any chemicals to a solution unless you know what effect they will have and always remember, the more complicated a solution is the more difficult it is to maintain and work.

While rose gold is a difficult finish to produce at first, it takes but a short time to become an expert in its production, and as it is the most popular finish of today, it will be found that the time spent in learning about its production has not been spent unprofitably.

METALS IN BEARINGS—ANTI-FRICTIONAL PROPERTIES OF LEAD.

By Samuel K. Patteson.

The amount of bearing metal in actual use in the U. S. today is very great. The value in money of this product is more than $50,000,000, of which at least one-half is consumed by the railroads in their locomotives and rolling stock, and the constant increase in these, together with the wearing out and replacement of bearings, makes it a matter of very great importance. The quality of the bearings in a machine affect very greatly its life, and in view of this fact it is a matter of surprise that knowledge in regard to bearing metals and alloys is not more general. Again, the nature of their production is such that while in some cases they have been manufactured under patents and sold under trade names, in the majority of instances they are made of scrap, with widely varying proportions of the different metals which happen to get into the scrap pile.

Probably no phase of engineering progress is the subject of more dissatisfaction and difficulty on account of the lack of scientific methods in the manufacture of the bearing parts in machinery. The purchaser of bearing metals in the open market today is compelled to take them more or less on faith unless, as is not generally the case, he has facilities for testing them, and even in different shipments of the same brand the properties of the metals are apt to vary greatly. Only the largest consumers can afford to make the necessary tests and investigations of a given consignment in order to ascertain its quality, and, in addition to the mechanical appliances necessary for such a test, a considerable amount of special knowledge on the subject is requisite. The only recourse left to the average small machine shop and small consumer in this field is the reputation of the firm furnishing the material and their personal experience. In view of this situation the rapid progress of firms who have succeeded in establishing a reputation for their goods is easily explained.

There is a variety of proportions of metals used in the manufacture of bearings. They are made from alloys of copper, lead, tin, antimony and zinc and are known as Babbitt metal, after the man who discovered this material, also white metal, brass, phosphorus bronze, etc. "Plastic bronze" and a number of others are manufactured and sold under patents, but a great majority of them are sold merely under trade names, and in many cases there is considerable variety in their composition, even though of the same brand.

The principal qualities necessary for a good bearing metal are, sufficient strength to withstand considerable strain, and enough compressive strength neither to crack nor break when subjected to heavy and sudden shocks, nor squeezed out of place under high pressure. The special purpose for which a bearing metal is required, however, is an important consideration in the selection of the article. In plants where the temperature variations are considerable, the expansion and contraction of the metals play an important part and the binding which may occur under these circumstances may result in the destruction of the bearing and the possible variation in the properties of the bearing, such as brittleness and ductility, under various temperature conditions. Again in refrigerating plants where the brine or ammonia comes in contact with the bearings, or from the same causes in chemical manufacturing establishments, the chemical effect on the various properties of the bearing alloys may be decidedly injurious. Also in dynamo and motor construction and operation the electrical conductivity of the bearings must be considered, especially in electrical machinery where the bearings themselves must serve as electrical conductors, such as the wheels in trolley cars and like installations.

Friction elimination and resistance to compressive loads have supplied probably more subjects for investigation in machinery progress than any other. According to Professor R. H. Thurston the value of the soft white alloys for bearings lies chiefly in their ready reduction to a smooth surface after any local impairment of the surface, such as would result from the introduction of a foreign substance between the moving parts of the bearing. A flaw of this nature is readily healed by the soft alloys flowing or squeezing into the irregularity and forming a larger area for the distribution of the pressure, with consequent diminution in its amount. Again, the larger area over which the pressure extends the less becomes the liability to overheat and produce binding. In view of this the frictional properties of a bearing are in inverse ratio to their compressive resistance and invariably the alloys best suited for bearings, from a high speed point of view, are not satisfactory for utilization in heavy machinery. An iron or steel grid has been recently introduced to form the base of the main bearing. This is filled with much softer bearing metals than could ordinarily be installed, in some cases even graphite being used. This is a real advance and from an engineering standpoint presents possibilities of great moment in this phase of machinery development.

Lead has the greatest anti-frictional properties of any of the common metals, as a result of the fact that it flows more easily under pressure. Some of the more costly metals exceed lead in this property, but their cost renders them unavailable. Lead is the cheapest of metals except iron. The prices of the various metals used in the formation of bearing alloys are somewhat as follows, per 100 pounds: Lead, $4; zinc, $5; antimony, $9; copper, $13; and tin $30 or more. Thus, the more lead a given bearing possesses, the softer it is, the less friction it possesses, and the cheaper it can be furnished. It is too soft, however, to be used alone, as it cannot be retained in the recesses of the bearing. Various other metals have been alloyed with it, such as tin, antimony, copper, zinc, iron and a number of non-metallic compounds, such as sodium, phosphorus, carbon, etc., and the variation in properties as a result of the addition of these different metals is fairly well understood. Thus in the case of a mixture of antimony and lead the hardness and brittleness increases, and if tin is added as well a tougher alloy results than would be produced by the combination of lead and antimony alone. Lead, tin and antimony, and sometimes other ingredients, are the constituents used in most of the various Babbitt metals on the market. An increase in the proportion of antimony used generally results in better wearing qualities, while the addition of tin increases the

price. For heavy machinery the higher antimony Babbitts are used to withstand the shock, while for lighter machinery, where high speeds are necessary, a bearing containing less antimony produces better results. The steady increase in speed of the modern machinery unit is responsible for a wide deficiency in this field in the duty performed by the bearing metal. The maintenance of satisfactory bearing surfaces is the chief difficulty in the development of the modern turbine. Soft Babbitts never have sufficient strength to sustain the weight and shock of heavy machinery, and it can be said that the only thing which limits the speed and size of machinery is the fact that the bearing metals available are not of the character which will give satisfactory results.

The effect of temperature on the bearing properties of the alloys used is very great, and undoubtedly this phase of the subject has not received enough attention in investigations in this field. A knowledge of the limitations in regard to the temperatures permissible with the means for maintaining these within fairly close limits will undoubtedly result in a great increase in the possibility of improvements in speed and weight of various types of machinery. Experiments are being conducted along this line, more especially in regard to bearings to be used in turbine construction, since the speed required here for efficient operation has made the problem an acute one.

The appended table gives a list of the bearing metals more or less common on the market today, together with the proportions of their component parts. The proportions used in the manufacture of the original Babbitt metal produced a very expensive article, but this difficulty has been much lessened in actual practice. A glance at the table will show the wide variation in the composition of the various Babbitts. The first Babbitt mentioned is not very hard, but is suitable for high speeds. Its melting point is about 500 deg. F., and it may be stated here that the properties of all alloys or bearing metals can be very widely deduced from their melting points. The second Babbitt metal given in the table is somewhat harder and melts at a higher point. These two Babbitts are used largely for lining purposes. The fourth Babbitt is considerably harder and is used principally for heavy machinery. All the Babbitts given are fairly satisfactory, and good results may be looked for from their use. Babbitt 6 has good wearing qualities, but is too hard for use in high speed bearings. The white alloys have a fairly good electrical conductivity and are used for bearings of generators, motors, electric cars, etc. The alloys containing sodium present a very interesting situation. The sodium produces by oxidation a material which by combination with the oil in the bearing produces soap which acts as a lubricating material. This phenomenon has not been investigated to any great extent, but is quite important in its effects. The other alloys included in the table contain copper, tin and lead to a very considerable extent. They are lined with a thin layer of lead or some soft Babbitt and under these circumstances wear very much better than the Babbitt made entirely of the softer metals. An increase in the amount of tin in the alloy tends to increase the wearing capacity of the bearing. On the other hand an increase in the amount of lead tends to diminish the frictional effect of the alloy and hence reduces the heating effect.

Pure copper is so tenacious that it is practically impossible to work it with any tools whatever without preliminary treatment and this property extends into and influences its bearing properties. A fact which is not generally given sufficient weight is that the structure and treatment of a solder affects considerably its tensile strength. Thus pressure or tension at the time of solidification of a solder so affects its internal structure that its wearing capacity is much reduced, and in general the cooling process and the consequent influence on tempering affects the structure of the alloy. The same properties which affect the hardening and tempering of steel by heat, and which extend to a more or less extent to all metals, are much more pronounced in alloys.

The above gives a general idea of the importance of bearing metals in the machinery world today. The possible combinations of alloys for this purpose are very great, but comparatively little data has been secured dealing with fusible alloys of all the different materials in different proportions. A large number of metals, such as calcium, etc., have been recently placed on the market, many of which possess very suitable properties for bearing alloys, and this development is bound to influence more or less the situation. In addition, various engineering devices, such as the steel grid, will undoubtedly receive attention and will probably be the means of securing increased efficiency along these lines.

TABLE.

Alloys.	Lead.	Tin.	Antimony.	Copper.	Zinc.	Other constituents.
Babbitt 1	80.0	20.0	....	....	....	.....
Babbitt 2	72.0	21.0	7.0	....	....	.....
Babbitt 3	70.0	10.0	20.0	....	....	.....
Babbitt 4	80.5	11.5	7.5	0.5	....	.....
Babbitt 5	0.5	68.0	....	1.0	31.5	.....
Babbitt 6	...	20.0	....	....	80.0	.....
Babbitt 7	...	86.0	10.0	4.0	....	.....
White metal	82.0	....	12.0	6.0	....	.....
White brass	...	64.0	....	2.00	34.0	.....
"Magnolia metal"	80.0	4.75	15.0	trace	....	Bi = 0.25
Car brass lining	80.5	11.5	7.5	0.5	....	.....
"Ajax plastic bronze"	30.0	5.0	....	65.0	....	.....
"Ajax metal"	11.5	11.5	....	77.0	....	.....
P. R. R. car brass, B.	15.0	8.0	....	77.0	....	P = 0.80
"S bearing metal"	9.5	10.0	....	79.7	....	.....
"Delta metal"	5.1	2.4	....	92.4	....	Fe = 0.1
"Carmelia metal"	14.8	4.3	....	70.2	10.2	Fe = 0.5
Tempered lead	98.5	0.08	....	0.11	....	Na = 1.30

SALES OF TIN IN JAVA.

American Consul B. S. Rairden makes the report from Batavia that the following public sales of Billiton tin were held in the capital of Java during the months of October and November, 1908:

On October 7 there was sold 5,600 slabs of Billiton tin, each weighing 74.8 pounds, at 27.32 cents per pound. On November 4 there was sold 5,600 slabs of Billiton tin, each weighing 74.8 pounds, at 28.5 cents per pound.

TREASURY DECISION. BEADED BUTTONS.

United States General Appraiser Sharretts has decided that beaded buttons are dutiable at 50 per cent ad valorem under paragraph 414, tariff act of 1897, and not under paragraph 408 as the collector had ruled. The goods in dispute were shanked buttons about 1 inch in diameter, the upper surface of which was ornamented with glass beads of several colors.

The Comptes Rendues (Vol. 146, page 868) contains an article on the origin of laminating rollers, in which it is stated that there is a figure representing the seventeenth century, in the Musée de Cluny at Paris, which suggests the laminating rollers of the modern rolling mill.

Martin Rupper, of Berlin, has patented (German Patent, 197,510) a solder for aluminum and its alloys, consisting of copper, 10; aluminum, 2; zinc, 25; tin, 60, and cadmium, 3 parts. Its melting point is so low that thin plates may be soldered. Paraffin is used as a flux.

HOW NOT TO DO THINGS.

By Frederick B. Stevens.

FREDERICK B. STEVENS.

This is an age of hurry, and the making the most of one's time, therefore, is an important acquisition.

The various papers that come to one's desk through the daily mail during a commercial life are evidence, just now, that the hurry plan is carried to the extreme.

We are all of us very glad to receive orders; they are almost as welcome as the glad tidings with which the Christmas and New Year's cards abound, but with the orders entails an obligation to fill them satisfactorily to the buyer.

There are a good many books written upon the subject of psychology; but just how a man at the desk may interpret the meaning of an obscure order, or how he may read the mind of the good-natured gentleman several leagues away who made out an indefinite order, would sometimes puzzle the mental capacity of a commercial Sherlock Holmes. Hence, a practical suggestion or two about refraining from certain common customs in vogue among the business fraternity may be in order. In short, less hurry and more care is the crying need.

It is not uncommon for me to receive an order marked "RUSH," wherein specifications consist of the following: "500 Sections Buffs, 14" x 1". This is clear enough to the man who wrote it, but it is just a little foggy to me, inasmuch as there are "loose," "sewed," "bleached" and "unbleached" buffs, to say nothing of the different qualities, each designated by its name. The word "RUSH" increases the perplexity, for the time taken to write for better specifications and for the consequent reply before making shipment, is quite liable to strain the patience of the particular individual who needs the buffs for quick use.

Some men who order chaplets also have great faith in the human perceptive faculty. There are "wrought iron chaplets with forged heads," "chaplet stems," "double head chaplet stems," "double head chaplets with forged heads," "wrought iron chaplet stems with square plates fitted," "double head chaplet stems with square plates fitted," "radiator chaplets," etcetera. But frequently the plan seems to be to order "chaplets" and let it go at that. Then the guessing contest begins in the office where the order is received; and if the office force is well trained and the letter head showing the order is sufficiently descriptive of the work made in the foundry in question, I am quite liable to fill the order "in good shape." Still, a little more "specifying" would be a great help. All of the foundry supply catalogues not only designate the different kinds of chaplets by the names given here, but a cut of each is also shown with its name, so a reference might be easily made when writing the order, and a possible error thus avoided by using the catalogue name.

When an order is given for cupola blocks, the diameter of the cupola is often shrouded in mystery. A cupola lining has an outside diameter and an inside diameter, and the difference in the outside and inside diameter is that of twice the thickness of the lining. For instance, one cupola block is 4½ inches thick, another is 6 inches thick; or, in other words, each one of these blocks will make a wall of the thickness described. Hence, an order for cupola blocks "for cupola 36 inches in diameter," would indicate a cupola shell of just that diameter. But if one goes on that supposition the blocks are liable to reach destination, when it may be discovered that the circle which they will make is not large enough, for the diameter, as stated in the order, has been given, inadvertently, of the inside of the cupola after the blocks are in position, and interpreted to signify the outside diameter, or, in other words, the diameter of the cupola shell.

This kind of an error may be avoided by giving the diameter of the cupola shell when possible, and, if not possible, then by giving the diameter of the cupola taken when blocks are in position, with further information as to the thickness of the wall made by the blocks forming that lining.

Letter orders are frequently received for a ladle with meagre description, such as "one two-hundred-and-fifty-pound bull ladle"; just whether this means ladle bowl and shank, or the ladle bowl only, is somewhat difficult to determine. There are, of course, different styles of ladles and shanks, and the seller is not the one to decide which will best suit the buyer. So, throughout the entire category, information cannot be too carefully given when issuing orders.

The way not to do things is not to become too brief; such terms as "same as before" or "like the last," when attached to an order may save some time when the order is dictated or written, but there is a possible risk of dissatisfaction when the shipment that follows is received. Some buyers have a form order bearing the printed instruction, "State when shipment will be made," followed with a dotted line for insertion of the date. The clerk whose duty it is to acknowledge receipt of such an order jabbers off "soon as possible," and this phrase is inserted by the typewriter, sometimes on a printed postal card, and leaves the one who receives it with just as much knowledge as he possessed before. Not quite as much, perhaps, because he had good reason to believe his question would receive attention; but such an acknowledgment indicates indifference, and such indifference sometimes seems to pervade the entire working force of a whole establishment. "Human natur' is warious," said Samuel Weller; and the desire to unload a burden is natural enough, but there is only one right way of doing the unloading and that is with all possible care concerning the detail.

How not to do things—is not to do them in the common way, merely because the careless method is most common, but to make all necessary effort to carefully convey to the man a hundred miles away the exact meaning without gambling too much upon his faculty of second sight. Saving of time is important, but it should be saved in the beginning or it is lost at the end, and no budding genius in a clerkship will blossom into a partner until he learns "how not to do things," and to do them well and not in too much of a hurry.

In some analyses of bronze implements of prehistoric man of the Lacustrian period (Lake Dwellers) L. Pellet and Wild have found the compositions to be: Copper, 80 to 92.5%; tin, 6.9 to 12.6%, and lead 0 to 9.9%.

THE RECOVERY OF PRECIOUS METALS FROM JEWELERS WASTE.

AN EXHAUSTIVE TREATISE ON THE SUBJECT, INCLUDING ALL FORMS OF WASTE.—TO BE CONTINUED FOR SEVERAL ISSUES.

BY JOSEPH CAUFFMAN.

Probably few people stop to think what becomes of their old and broken jewelry; they know better than to throw it away, so usually carry it to the nearest place bearing the sign "Old Gold and Silver Bought," but here their interest ends. But it is all "recovered"—that is, the precious metals contained in the various articles are taken out and purified, and are then ready to use over again—the gold and silver are separated from the brass, solder and other alloys, and are then fit for remanufacturing into the finest kinds of jewelry and ornaments.

In every day life, we see only broken spoons, watch cases, brooches, rings, etc.; but there are many other sources of valuable waste, and some are amusing as well as astonishing. The largest and most natural source consists of the residues from various manufacturing processes employing valuable metals; but there are many smaller sources, and it is among them that the most interesting instances occur. It is self-evident that it pays to keep the scraps of metal from the table of the workman cutting out gold badges, or manufacturing settings for diamonds, as these can be easily remelted; but the more intricate part comes in when the waste is in such form that the precious metal cannot be seen with the naked eye, and cannot be extracted with the hand, but requires smelting and various chemical processes to get the metal back. Silver and gold fillings, mixed in with the dust and dirt of the floor, do not look valuable; the value cannot be seen by merely looking at the accumulation, but it takes only a very little gold dust in a large box of dirt to make the whole worthy of the trouble of working it to get the gold out, and there are indeed few forms of such waste that are not worth working.

If, therefore, there is any considerable value in these wastes, it would be foolish to throw them away; this is done only by those who are either not intelligent, or are, in plain English, too lazy to take the trouble. Neglect of these methods of saving is one of the largest causes of "leaks"; the careless manufacturer will wonder why he does not make money, and, in addition, his manufacturing costs will be higher than his thrifty neighbor's, and consequently his selling prices also, so that he cannot compete successfully with others. Here, truly, a "penny saved is a penny earned."

Where do we get our metals from in the first place? The natural source consists of ores, which are rocky substances, composed of various minerals such as silica (sand), lime, etc., with which is mixed, in varying states of impurity, the various precious metals; and the different metallurgical processes deal with the problem of getting the valuable metal separated from these rocky or mineral substances. The difference between nature's ores and man's waste materials is practically none, for the latter are composed of the same general materials, and are accordingly separated in the same way, the principal difference being that the waste and scrap are easier to handle than the ores, because while in the latter the metals are often chemically combined with the impurities, in the waste the impurities are merely mixed, and can sometimes be separated by mechanical means alone, avoiding the time, labor and expense of tedious and expensive chemical processes. And just as ores are sometimes too poor to make it pay to work them—that is, containing too little precious metal to warrant the expense—so the waste products can also be worthless, and in both cases their value is determined by means of an "assay" test, a prepared sample being smelted to find the exact gold and silver contents.

SAMPLING.

These samples, which must be representative of the quality of the lot, are obtained by thoroughly mixing the material, and then taking small portions from different parts of the pile, again mixing them, and then using a small portion of this final sample. If the material consists of only a hundred pounds or so, total, it is best to mix the entire quantity; but if there are several tons, a shovelful should be taken from a number of different parts of the accumulation—say a dozen in all—according to the quanity; these are thrown in a pile and carefully mixed; the pile is marked into quarters and two diagonally opposite quarters are taken out and again mixed, and in turn quartered and mixed; this is continued until the pile has dwindled down to about two pounds—more or less, according to circumstances. This sample, now considered to fully represent the quality of the lot, is used to estimate its value. The assayer weighs out an "assay ton"—an arbitrary standard representing a small quantity—easy to handle—and adopted as the most convenient method, as it shows, without further calculation, just how much gold and silver the product contains; the metals, when obtained from the sample are weighed in milligrams, and the number of these corresponds exactly with the number of ounces of metal that would be contained in a ton of 2,000 pounds of the material in hand.

In the case of ores, the sample only needs to be ground fine, when it can be tested without further treatment, as the material is homogeneous; but in the case of waste, of which sweepings from the floors of jewelers are perhaps the most representative, no fair sample can be obtained so simply, for the "sweeps," as they are called, consist of a little of everything; in addition to the precious metals, they contain pebbles, iron nails, bits of glass, pieces of wood, paper, etc.; and the presence of the iron and glass is especially undesirable, as they prevent a good melt and cause loss of gold and silver. But such material, if in large quantity, must be treated like an ore, and a sample assayed, for on this assay the sweeps are bought; or, if worked up for the customer, agreement is made to return the percentage of metal shown by the sample to be in the sweeps. If, however, there are only a few pounds of the material, it saves time and trouble to treat the whole just as if it were a sample, melting it down at once, thus obtaining the metal out of it without delay. Large lots cannot be handled this way, as it would be too inconvenient, and, if of poor quality, too expensive. When taking a sample, if the material is fine, and can be thoroughly mixed and immediately assayed, no departure from the ore method is needed, but usually it is by no means so simple a matter. If large pieces of wood, or rags and paper are present, they absorb, especially when wet, considerable fine particles of metal, so that representative samples could be obtained direct. We must therefore burn out all such organic matter and reduce the sweeps to a perfectly homogeneous substance. It is therefore thrown into a special furnace, which burns out all dust, paper, wood, etc., leaving only metal and other inorganic matter, such as stone, sand, etc. All iron must be removed; this also has precious metal sticking to it, which is removed in the next operation.

(To be continued.)

THE DESIGNING OF STERLING FLATWARE.

By A. F. Saunders.

Design must necessarily be defective if applied indiscriminately to different materials; all materials require difference of treatment according to their nature.—Ruskin.

Of all the numerous articles of utility and beauty made by the modern silversmith, none is of more importance than what the trade terms flatware, namely, spoons, knives, forks, etc. The spoon dates back far beyond the metal age, not as we know its use to-day, but more as a scoop made either of shell, horn, or wood, then of pewter, and finally of the precious metals. Knives and forks are of more recent origin, mention of these articles for table use of guests being found for the first time in inventories of court treasurers of the late thirteenth century. It was not until the sixteenth century that we find frequent mention of the fork and then only at the table of the nobility. The first forks came into England about 1607, a much later date than that of their appearance in other countries. However, as this article deals with modern times I shall reserve these historical facts for future writing.

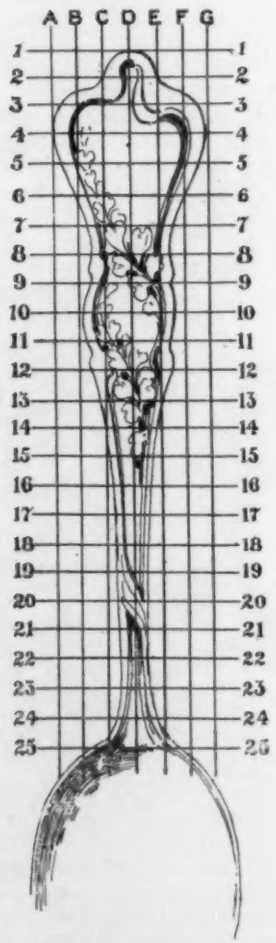
Our first silver flatware was made by hand, each piece carefully shaped by the craftsman; if ornamented, this was most simple, such as the old shell pattern, kings, or perhaps some simple engraved motif, the former patterns being usually punched or hammered from a crude iron die. While all this treats rather with the process of making, nevertheless, it is directly connected with the designing, as in those early days the craftsman was his own designer, thus adding a value to the work that can never enter into the machine-made articles of to-day.

The modern designer has many things to keep carefully in mind. His main aim should be to create an article combining both utility and artistic merit; to create a design that not only looks well, from the smallest salt spoon to the largest ladle, but a design or pattern that will wear well and have great character. This may seem easy upon first thought, but, believe me, it is not. I think to create a successful flatware pattern is one of the most difficult problems a designer has to work out. I have known patterns of exceedingly good design, that is, of good outline proportion and style, yet prove poor sellers. Sometimes this is due to some little feature that just doesn't seem to appeal. I have in mind a flatware pattern of early Gothic that became popular almost immediately upon the removal of a small bunch of grapes about midway the handle; it changed the effect of the whole piece. This simply shows the careful study of detail that must be considered and studied. It is not only

NO. 1. ST. REGIS.

NO. 2. COLONIAL.

NO. 3. ST. MARTIN.



NO. 4. DESIGNING.

discouraging to the designer to have a pattern prove a poor seller, but it is more so to the manufacturer who has invested hundreds of dollars in cutting steel dies, hubs, etc., so that one can easily realize what a careful proposition such work must mean.

Outline and proportion are first; practical decoration second. Over-elaboration is most objectionable, not only from an aesthetic point of view, but it also renders the piece unserviceable, since, naturally, spoons, forks, etc., are in constant use, thus meaning much cleaning and handling, and any pattern of a heavy, bold character is both unpleasant to handle and hard to clean. Also the effect of a well-laid table depends greatly upon the flatware, even though the other articles of decoration and use be of an ornate character. Let the flatware be of simple design yet harmonious.

Note the rich effect of spoon pattern No. 1, a floral motif; or the engraved colonial No. 2 and the French pattern No. 3. One of my most successful patterns was in a plain hand-hammered effect with a simple engraved wreath; yet style often demands extremes in spite of good judgment and thought.

In getting out a new pattern an amount of detail must be gone over as to the different size pieces. The design is usually made in one of the medium pieces such as the dessert spoon; this settled upon the others are scaled, that is, reduced or increased according to the size handle to be made. This work must be done most accurately, and if done by the designer, lines crossing one another, forming small squares, as shown in drawing No. 4, are drawn, each size in proportion to the original, each line of ornament crossing the corresponding line in exactly the same place. These working drawings are usually done on very transparent tracing paper so they can be used by the die cutter, who is also furnished with cross sectional views and a good model in wax of one piece. In the large shops where the die work is done almost entirely by machine this work is greatly simplified and mechanical accuracy is assured.

machine from a model in plaster of paris, but, however

All this reducing and increasing of sizes is made by made, each piece must be absolutely correct as to proportion and match of outline and ornament, both the front and back. The fancy pieces, such as servers, scoops, knives, etc., are made from the different size handles, bowls, or blades, being ornamented to match and sometimes pierced next to the design.

The die work is by far the most important, as many good designs have been ruined by poor cutting. The die sinker, as he is called in the shop, should work in perfect harmony with the designer and vice versa; otherwise poor results are sure to follow.

In concluding this article I wish to impress upon those interested in metal work, especially in the designing department, that the successful designer must have a working knowledge of the shop; he must understand the possibilities of the machines used and be able to see his work, not as a fine drawing or sketch, but as the finished article, useful as well as decorative. I quote a few fundamental principles which I endeavor always to keep in mind and follow in my work:

First.—Form is the most beautiful that is the most appropriate for its purpose.

Second.—All ornament should be subordinate to the object ornamented, and if kept duly subordinate, the object cannot be over-ornamented.

Third.—Flat surfaces should have a sufficient amount of flatness in their ornamentation as not to destroy their quality of flatness.

PLATERS' WRINKLES.

Series No. 1.—Nickel Solutions.

By Charles H. Proctor.

In platers' wrinkles I have endeavored to give some practical information that can be relied upon to use when occasion requires it. While these wrinkles may not be new to many platers, to others they may prove of much value.

When a nickel solution produces dark tones, it is deficient in nickel unless a copper salt of some form has been accidentally added.

A few ounces of single sulphate of nickel added to each gallon of solution will accomplish better results than a pound of the double nickel salts. To maintain a nickel solution in constant operation add only the single sulphate of nickel. The single sulphate of nickel dissolves very readily, especially in boiling water, and contains more than twice the amount of metal in the double sulphate of nickel and ammonia, therefore enriching the bath with metal twice as much.

The peeling of nickel deposits is not always due to imperfect cleaning, imperfect removal of oxides, free acid, or free alkali in solution, but to a lack of conducting salt. This can be oftentimes remedied by the addition of common salt, sal ammoniac or sulphate of ammonia. When the conductivity of a nickel solution is poor dark lines will be found covered by the supporting wires or frames. A stronger current applied will not make matters any better. A conducting salt is needed, 2 or 3 ounces of which, added to each gallon of solution, will overcome this difficulty. Nickel solutions very seldom need a conducting salt; when once prepared, they do not decompose very rapidly, so remain quite constant. Some anodes are very hard, especially those cast in chilled moulds and do not reduce readily; any disturbance then noted, unless the bath had become contaminated with some foreign substance, would be due to a lack of metal in solution.

If a nickel deposit stains very readily it denotes that the solution is radically alkaline. Boracic acid is highly recommended for acidulating nickel baths, but for many baths, chemically pure sulphuric acid is just as good and oftentimes better, and very much cheaper. For a one hundred gallon bath dissolve in water 10 ounces of the acid and add to the bath at the close of the day's work, stirring thoroughly. The solution will be found to have cleared by morning and the staining will be overcome.

Stains are sometimes produced upon nickel deposits by contaminated rinsing waters, or by drying out in sawdust that has become sour. One of the best aids to drying out nickel or any other deposit and to prevent stains is the old-fashioned plater's compound, called whale oil soap, on account of its fishy smell, 2 ounces of this material dissolved in each gallon of boiling water will act as a dryer. Water will completely run away from the surface of the articles, thus saving labor and much sawdust.

(To be Continued.)

INDUSTRIAL

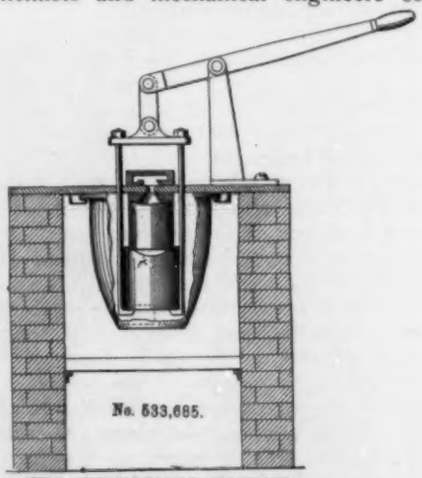
NEW AND USEFUL DEVICES, MACHINERY AND SUPPLIES OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

DIE CASTINGS IN BRASS—A NEW ACHIEVEMENT

By H. H. Doehler.*

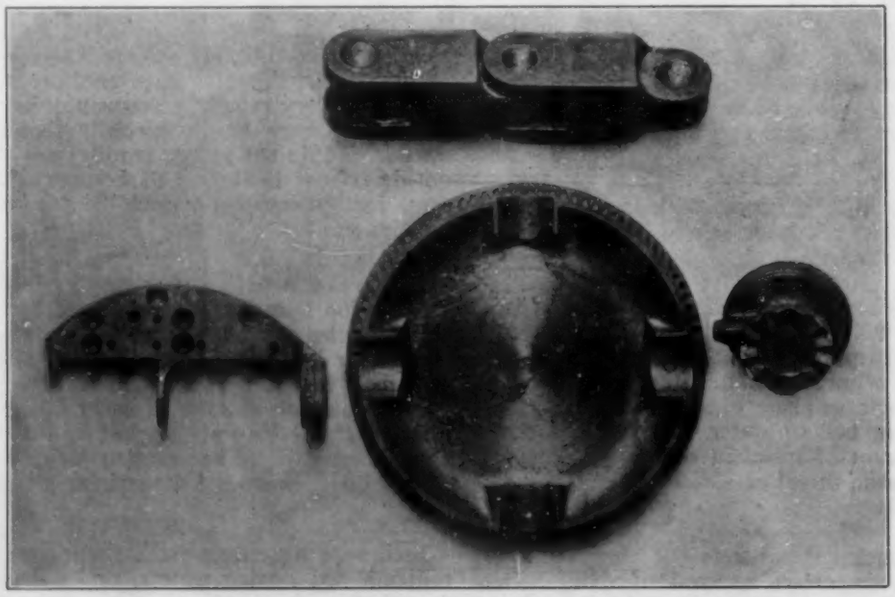
Die castings or pressure castings, also known as finished castings, have taken their place as an important factor in the commercial and mechanical world. Heretofore a great limitation was put upon them by the apparent impossibility to produce them in high fusing metals such as brass and bronze. All concerns engaged in producing die castings are using white metal alloys. Most of these are zinc alloys containing from 80 to 90 per cent. zinc alloyed with tin, copper and aluminum in various proportions. All zinc alloys as commercial metals have a great many shortcomings and can be applied successfully only when the die-casting firm is scrupulously conscientious in handling the zinc alloy while making their castings, extremely careful in investigating where and how the casting is to be applied and backed by the necessary experience and knowledge how to design the part to be cast. There are also some tin alloys used, but the comparatively high price of these alloys and their softness reduce their useful field to very narrow limits. The best and most used tin alloy is Parson's white brass and its largest field is die-cast "finished bearings." Some lead alloys are also used successfully and I believe our concern has been the first one to introduce a steam resisting lead alloy cast in metallic molds for finished parts.

Recognizing the enormous field and output if a yellow metal could be cast in molds successfully and commercially, also realizing the limitations and shortcomings of the white metal die castings, I started a number of years ago a series of experiments to perfect such a process in spite of the popular opinion or rather established fact of this to be an impossibility and notwithstanding the numerous and positive discouragements received by the metallurgists, chemists and mechanical engineers consulted.



THE UNDERWOOD PATENT.

Like in all radical changes, important inventions and fundamental improvements, one has to get away from the established grooves and antiquated systems. The latter in this case or in the manufacture of die castings is a plunger casting machine. To be more explicit, a casting machine with a cylinder submerged in the molten metal and a plunger working in and out and over an opening forcing the fluid metal by lever power into the mold. (For further particulars see H. G. Underwood's Patents,



MANGANESE BRONZE PARTS DIE MOLDED.

* President Doehler Die-Casting Company, Brooklyn, N. Y.

1895.) I think I am conservative in stating that all die-casting concerns cling to this old principle in some shape or form except our firm. By perfecting a new process with new principles, success in casting brass in metallic molds was awarded to us.

Finished brass castings, as the name indicates, are cast in a finished state requiring no further machining. Accompanying photographs show the castings as they come from the mold, all holes, lugs and other irregularities cast with all dimensions accurate without being machined. The consequent advantages therefrom are numerous and far-reaching. By our way, the manufacturer sends in a drawing or model from which we construct a metallic mold, good for any number of castings. Our castings are delivered in a finished state, ready for assembling, thereby doing away with machinery.

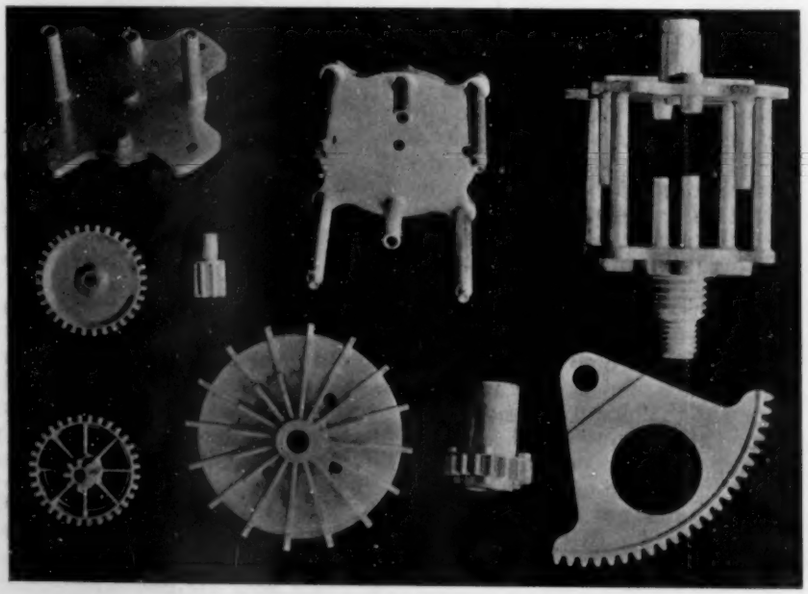
However I do not wish to convey the idea that we can cast by our process any and all kinds of brass parts. Being a conservative concern and fully aware that our process is in its very infancy we have so far attempted only small castings, not over 8 ounces in weight. This does not mean we are limited to this weight; on the contrary, there is hardly a weight limit in our process, but as we are entering an unknown sphere we wish to move slowly and safely, gather experience by the roadside and improve as we go along. Very intricate parts, or such requiring a great deal of machining, are the best adopted. We cannot as yet compete with the automatic screw machine or the stamping press. I also wish to state at this point that it is absolutely essential for us to know the surroundings, application and function of the part we are supposed to make. While the brass we use in these castings is suitable for any part made from cast-brass we prefer to know the conditions it has to work under for various reasons which we have to take up with each case individually. Generally speaking, it has a tensile strength of 60,000 pounds, is golden yellow in color, non-corrosive and quite malleable.

A great deal of harm has been done in the production of die castings of white metal by using the wrong alloy not suitable for the function of the piece or by not reconstructing the part making it suitable for die casting so to give strength by design where it is lacking by nature as it is in white metal alloys. Even in brass we need the fullest details to be able to give not only satisfaction, but also work to mutual advantage by simplifying the part with our knowledge and wider range of casting irregularities not yet commonly known. Close dimensions ought to be especially indicated. It is beyond human efforts to produce parts commercially with 10, 20 or more dimensions accurate within thousandths of an inch. If we are kept uninformed about the particular dimensions we are apt to waste time and effort in the wrong direction. Such accuracy naturally depends on the construction of the mold, requiring the finest workmanship backed by a thorough experience in mold designing for die casting. These molds are metallic molds constructed to stand up indefinitely within reason. As they are made under our patents they cannot be delivered, but will remain in our possession for the exclusive use of the party they were made for and paid by. They cannot be used by any other die-casting concern anyway, as our process is thoroughly covered with patents. I thoroughly believe that within a comparatively few years our new and economical way will completely replace the old and wasteful way in exactly the same manner as the casting of concrete blocks replaced the old and wasteful stone cutting and stone patching method.

DIE CASTING IN WHITE METALS—RECENT PROGRESS.

By A. Trowbridge.*

The making of castings in metal dies has been practiced for many years but many improvements have been made in the art in the past few years. No better proof of this is required than to examine one of the cyclometers or counters made by this process at the works of the Veeder Manufacturing Company, in Hartford, Conn. These instruments consist of a number of small rings, together with their actuating mechanism and gearing, contained in a suitable case.



WHITE METAL PARTS DIE MOLDED.

*Works manager, Veeder Manufacturing Company, Hartford, Conn.

The basis of "Veeder Metal" is tin. This makes the castings lighter than brass pieces of the same size. It also makes a white metal which is uniform in color throughout and does not tarnish on exposure to the air or to moisture. This non-tarnishing quality makes it possible to use these castings without plating them and should they become worn from contact with the fingers or with other parts, no change of color is noticed. The metal can be plated, if desired, and a surface obtained to match the color of any other metal. For use in cash registers, fare registers, voting machines, etc., the parts are seldom plated. When it is necessary to machine the parts, a properly sharpened tool leaves a clean, bright surface that needs no further polishing.

Die molded castings are smaller than the sizes of the dies in which they are made because the metal shrinks somewhat in cooling. This shrinkage varies with the shape and size of the piece. It can be calculated quite closely for simple pieces but, when it is necessary to match parts made in any other way, it is advisable that the die castings be made first and the other parts fitted to them. If this is not done, the dies must, in some cases be so made that they can be ground down to size after a number of sample castings have been made to determine just what the shrinkage will be.

The exact strength of the metals which can be cast in steel dies is of vital importance in determining their usefulness. The tensile strength of "Veeder" metal is about equal to that of cast iron, being 15,000 lbs. per square inch. Its compressive strength is about 20,000 lbs. per square inch, hence it is not adapted for use under heavy pressures. It is much more ductile than cast iron and can, as a consequence, be used for very thin pieces. Moreover its toughness permits of its being tapped even though the walls are very thin. It is apparent that to secure uniformity of castings, the treatment of the metal in this work must be uniform. On account of this no variation of hardness can be obtained except by varying the alloy. The amount of this variation is quite limited with any one metal so that proper allowances must be made in the design of die-molded parts to secure the necessary strength and rigidity. Pure aluminum has not been successfully cast in dies.

Some variation can be made in the composition of the metals used for die casting and various degrees of hardness and strength obtained thereby. The Veeder Company have three grades of metal. The most commonly used is their softest mixture, called No. 1 metal, which can be readily spun or riveted. The medium hard metal can be spun slightly and is stronger and wears better than the No. 1 metal. The hardest metal is used mostly for pieces that must withstand compression. This grade is too brittle for spinning.

In buying die-molded castings one pays for no waste metal. As the pieces are "finished" when they come from the dies there are no chips to be saved and stored. The usual manner of charging for these castings is to charge a certain amount for making each casting and add to this the cost of the metal. Only the metal in the finished pieces is charged for because any scrap made in getting out these pieces can be melted over at slight cost.

According to the Textile World, "Every industrial country in the world save one has now a proviso in its patent laws that a patent may be revoked if not worked in the country granting it. The one exception is the United States of America."

NEW PLATING DYNAMO.

The W. W. Oliver Manufacturing Company, Buffalo, N. Y., one of the largest manufacturers of jewelers' equipment, rolling mills, lathes, polishing machinery, drop presses, draw benches, etc., in the United States, has recently put on the market a new low-priced plating dynamo, very small in size, which they claim represents an advance in design and construction over other machines of this character now in use. One feature hitherto found only in larger and higher priced dynamos is the commutator, which is built of drawn copper segments insulated by mica from each other and from the shaft. The commutator usually furnished with this class of machines consists of slotted brass or copper tubing without insulation between the segments, which construction, it is asserted, is open to criticism on account of the slots becoming filled with dirt and bits of metal worn off the brushes, which causes short circuits and diminishes the capacity of the machine.

NO. 1. PLATING DYNAMO.

The field coils of this new machine are form-wound and carefully insulated. The armature core is built up of steel laminations to insure against loss of power through overheating. The brush holders are designed to cause a uniform pressure on the brushes whether the latter are new or worn, and are also adjustable for regulation. The brushes are built up of copper gauze. The bearings are of bronze and are provided with dust proof oilers.

The machine is furnished by the Oliver Company complete with pulley ready for operation. It will develop eight amperes at 2,000 revolutions per minute.

CHEMICALLY PURE AND GREEN GOLD ANODES.

H. F. Carpenter & Son, of 60 Page street, Providence, R. I., prepare a chemically pure gold for coloring purposes that has many advantages. Prominent among these are uniformity of color, longer wear before tarnishing, and economy, as it does not require as heavy a deposit to stand acid. In using this gold to make their green gold anodes this concern pays particular attention to obtaining the best possible color and considers the exact karat fineness and cost of production as of minor importance. This firm makes also an oxidizing fluid that has been on the market for many years and is known all over the country.

THE WORD "CRUCIBLE."

The Joseph Dixon Crucible Company recently received a request for a copy of their catalogue and lowest prices together with the following: "Let us know if you keep this one in particular, viz.: A statue of Christ on a wooden cross with a number of holy pictures that revolve by turning a wooden knob." The Latin word *crux*, meaning cross, was thought to be the derivation in several languages, of the word crucible.

A NEW SKIMMING TROUGH.

In these days of driving competition every one is trying to cut down cost of production, and in no business is this more true than in the metal industry. Economy and cleanliness have become the watchwords where extravagance and slovenliness reigned supreme.

The casting shop or foundry of a metal producing business is the place where stopping up of leaks should begin. With this end in view the usefulness of the device shown in the illustration will be at once apparent. This is a skimming trough which is being manufactured and sold by the Metal Dross Economy Company, of Bristol, Conn.,

A NEW SKIMMING TROUGH.

of which A. L. Haasis is president and sales manager, and W. H. Carpenter, vice-president and general manager.

The trough consists of a square cast iron box about 18 inches deep and a sheet iron cover with slot in the front. The box is sunk into the floor and half filled with water, as indicated in the photo plate. The caster bringing the pot of hot metal to the trough skims the dross and charcoal into the slot. On the drosses coming in contact with the water there is an instant separation of the metal from the dirt.

The unburnt charcoal remains on top of the water and can easily be raked off and dried and used again next day. The slimes and metal are shovelled out from the trough and washed through a thirty mesh and then through a fifty mesh riddle. All that remains in the riddle is pure usable metal in shot form, and can be put into marketable goods the next day. The remaining slimes find a ready market with the refiner.

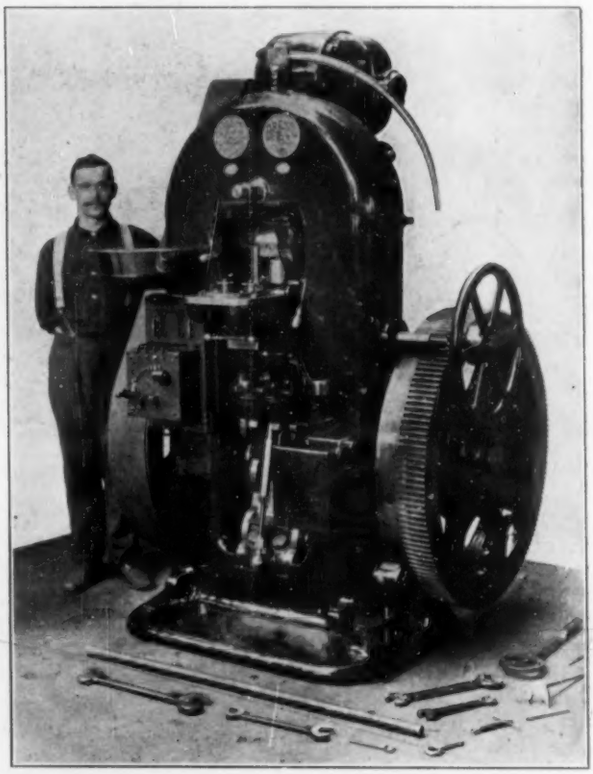
The inventors claim a saving of 25% in the amount of charcoal used, 75% in the material sent to the washhouse, and a reduction of 20% in the metal sent to the refiner. The box need not be cleaned but once a day. In a rolling mill shop one box will answer for 5 to 6 furnaces, and in a foundry 10 to 12. These skimming troughs are now in use and giving entire satisfaction at the Fort Hill Bronze Company, West Everet, Mass., and the Bristol Brass Company, Bristol, Conn. Patents have been applied for by the Metal Dross Economy Company to protect their invention.

CHEMICALS AND PHOSPHORUS.

The General Chemical Company, Moro Philips Works, Philadelphia, Pa., are now manufacturing hydrofluoric acid in large quantities. This acid will be found vastly superior to sulphuric or muriatic acids for cleaning castings that are to be galvanized, japanned, nickel-plated or painted, etc. Hydrofluoric acid leaves a purer metallic surface and does not cause a rusting out of the work through the finish coat. The acid is furnished in special barrels of about 400 lbs. or in lead cartoys of 100 lbs. This company also manufactures a superior grade of phosphorus which is put up in the form of sticks and cakes. The cakes are made in weights of fractions of a pound and over and are very convenient for use in the manufacture of phosphor bearing alloys, requiring the use of a definite weight.

NEW FERRACUTE COINING PRESS.

The Ferracute Machine Company of Bridgeton, New Jersey, has recently shipped to a foreign country for use in its national mint the coining press shown in illustration. All modern coining presses contain the



NEW COINING PRESS.

toggle or knee-joint principle to produce the great pressure required to make the cold metal "flow" sharply into the recesses of the design sunk into the hardened steel dies.

There are several features in this machine that are

new. Coining dies must be set with extreme accuracy, the press being run by hand during the operation. The usual method has been to insert a bar or lever in a hole in the face of the fly-wheel, but in this machine a hand-wheel and pinion, engaging with teeth cut in the rim of fly-wheel, enable the operator to revolve the press by hand with ease. The hand wheel stud is made sufficiently long to allow the hand wheel to be slipped out of gear without removing from the press.

Another new feature is the adjustable stationary ejecting rod which extends up through the bed and ejects the coin as the ram descends. The swinging head is also a valuable device. Pressure on the hand lever at the left of the dies unlocks the head, which can then be swung outwardly by the hand lever at the right. As this head contains the upper die which must frequently be inspected, the convenience of this arrangement is apparent, the ordinary method being to remove the die. The head can be swung back and locked in position in an instant.

The lower die, with its connected parts, may also be removed with convenience and despatch by turning three hand nuts, two being shown on the bolster, the other being at the back of the machine. Much attention has been devoted to the feeding mechanism, which is claimed to be superior to that used in common practice, it being impossible in this arrangement for two coin blanks or planchets to come between the dies at the same time. The press illustrated runs from 90 to 120 per minute and the pressure exerted by the ram is 250 tons. It is the third in a series of four sizes built by the Ferracute Machine Company and weighs 10,700 pounds.

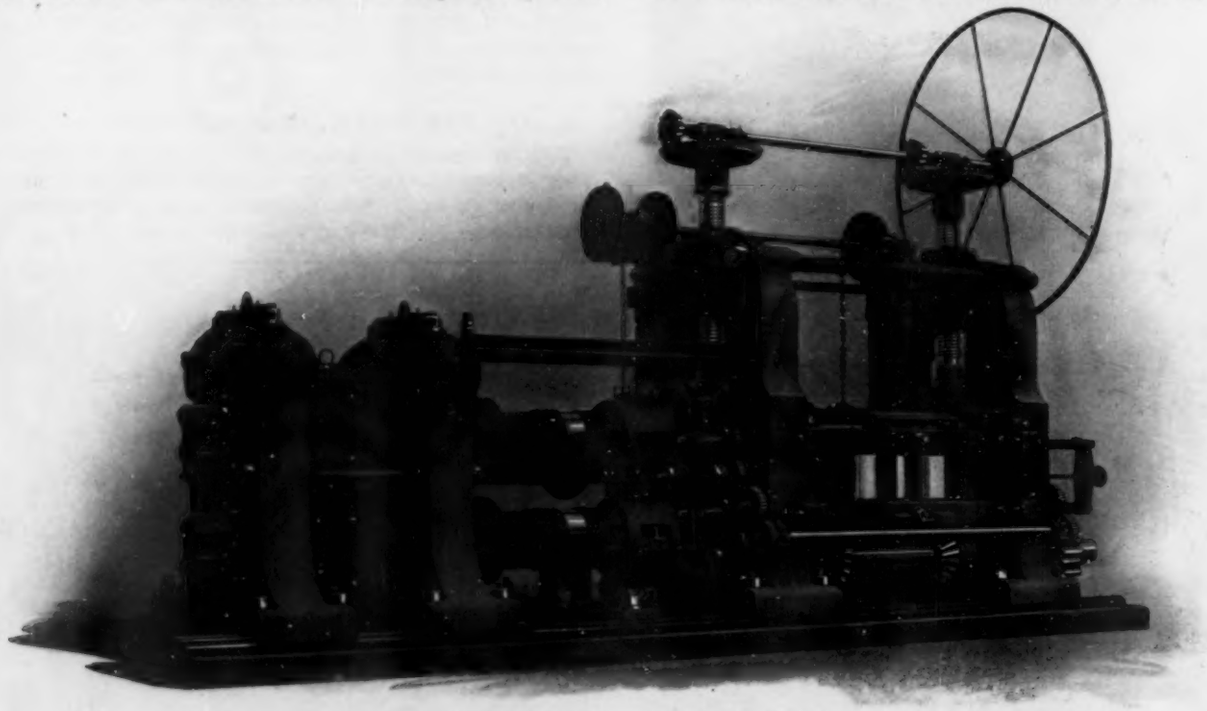
In Paraguay more plated watch chains are sold than solid metal. While all the standard patterns and designs are displayed, the double chain is preferred. The vest bar is not liked and all chains have a slide spring ring for attaching the chain to the vest. Germany imports most of this trade.

A NEW UNIVERSAL PLATE MILL.

The Universal Mill which is shown in the cut was built for the Michigan Copper & Brass Company of Detroit, Michigan, by the A. Garrison Foundry Company of Pittsburg, and was designed to meet the special requirements of copper and brass service.

The mill is two-high and the rolls are 24″ in diameter and 72″ long. They are driven by a pair of double helical toothed pinions, which are inclosed in an oil-tight box, as will be seen, and which construction, besides perfectly lubricating the revolving pinions, gives unusual stiffness and strength to the pinion housings, which are practically one case or receptacle.

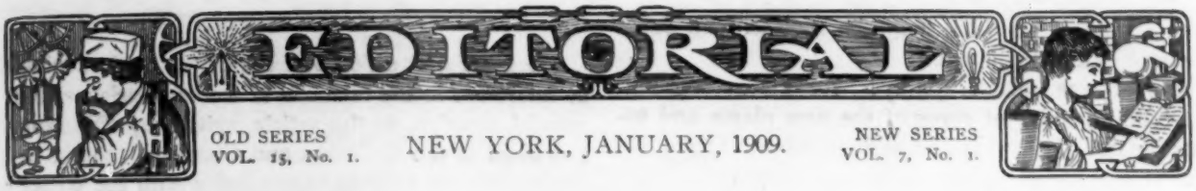
The vertical rolls are carried in a cast steel frame and are actuated by means of mitre gears which are driven by means of the horizontal shaft below the rolls, which shaft in turn is driven from the bottom roll by means of heavy spur gears, just showing on the far side of the end housing. These vertical rolls, with their containing frame, are so designed that they are removable, the shaft beneath favoring this operation, and when the vertical rolls are removed, the mill is used simply as a plate mill, having rolls 72″ long. The extreme opening of the vertical rolls is 20″ and the least opening of the vertical rolls is 2″.



TWO HIGH UNIVERSAL PLATE MILL.

The mitre gears and spur gears are of nickel steel; the housings are usually heavy and a table is provided on the back side of the rolls, which is elevated by means of a steam or air cylinder connected with it by a chain, and which can just be seen on the back side of the roll housing next to the pinions. This cylinder is supported on the roll housing and is self-contained. On the other side is placed a stationary table or fore plate, which is not shown in the cut.

The particular value of this mill is that longitudinal shearing, with its labor and loss, is completely obviated, and the plates and bars are delivered with square edges and in commercial form, when it is operated as a universal mill and when it is worked as a plate mill, plates up to 70″ wide can be rolled upon it.



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THE AMERICAN METAL TRADES IN 1908—OUTLOOK FOR 1909.

The industrial and financial panic which marked the close of the year 1907 bid fair at the opening of 1908 to continue indefinitely and to assume most alarming proportions; but, however, so wonderful are the recuperative powers of the business interests of this country that it really amounted to a little more than a large-sized scare. However, as a proof that its effects were far-reaching, we refer our readers to the report of our British correspondent published in this issue. This report shows that American conditions were reflected to a worse extent in the British Isles and European countries. A general idea of the condition of the metal market and the fluctuations of prices for the year may be obtained from our metal market review and chart of metal prices which is published also in this issue. As to the several causes contributing to these changes space does not permit us to dilate upon, but we will touch upon a few causes for the lessening of the demand.

FOUNDRIES.

The tendency has been throughout 1908 for the majority of the foundries to shelve all plans for extensions and to get along with present equipment, meanwhile taking advantage of the dull times to overhaul and put in good working order present plants. Prices for castings fell with the prices of metals, as a matter of course, to as low a basis as they have been for some time, although the lowest prices for iron and copper were not as low as those in 1903. This was probably due to the fact that holders of large stocks of these metals were better able to carry them this year than in 1903.

ROLLING MILLS.

The year 1908 stands in sharp contrast to the immediately preceding years by the noticeable absence of new mills and extensions of old plants. In 1907 we recorded the establishment of eight new mills, a number more projected and the old mills enlarging their plants. The past

year not a single new mill has been reported and but a few minor extensions noted.

The year was notable, however, for the getting into good running order of three of the new plants and towards the last of the year one of them was running overtime.

MACHINERY.

There has been the normal amount of new and improved metal working machinery during the year, but no great innovations as in 1907. A year ago we recorded the installation of a continuous mill and an engineless mill (run entirely by electricity); these being the most noticeable improvements. The new designs recorded this year have been more in the line of improvements in smaller machines used in working metals in the casting and sheet form.

The demand in the machinery market has, of course, slackened in keeping with general industrial conditions. A great number of the concerns engaged in making this class of machinery being content to move along slowly, working on stock in a great many cases for the sole purpose of keeping their organization intact.

PLATING.

New electro-mechanical plating devices were among the features of 1907; comparatively few of these inventions have been noted in 1908, and what were being mainly new patents on minor improvements over existing types.

The industrial setback early in the year affected the plating trades quite seriously, particularly in the collection of accounts. The inability to meet payments for material was eased in a measure by the plating supply houses extending extraordinary credit, and the practising of economies by all concerned.

SILVERWARE AND JEWELRY.

The silverware and jewelry trade suffered severely at the close of the year. At the same time, with the general conditions as they were, it is surprising to note that the factories making the cheaper grade of jewelry have been uniformly busy throughout the year, so that fortunately the year has not been, on the whole, as bad as was generally expected. The fitful spurts of business revival in spring and fall and the late but encouraging holiday business has served to help bring up the average of the total amount of sales to the normal point.

CONCLUSION.

Reports of all of our special correspondents published in the following pages show a marked improvement in all lines of business and a very good outook for 1909.

THE TARIFF.

Representatives of the producers and consumers in the aluminum and lead industry of the United States appeared during December before the Tariff Committee of Congress and gave their views on why the tariff on aluminum and lead should and should not be retained. The committee took a mass of testimony preliminary to making their report to Congress.

ANALYSIS WITHOUT STUDY.

We call the attention of those of our readers who may be interested in the relations of technical science to commercial practice, to the article written by "Experience" published in our Criticism and Comment column in this issue. We are entirely in sympathy with the writer and agree very nearly with his sentiments. A great many attempts have been made to simplify chemical analysis so that determinations of some of the more common elements could be readily made by a layman. These have been successful only to a limited degree. Chemistry is an exacting science and it requires a long and tedious apprenticeship before one can become an expert analyst, consequently it is perhaps expecting a little too much that an inexperienced man could arrive at accurate and concordant results by simply following out the scheme laid down in the original article. In this connection it might not be considered too facetious to remark that the tyro might find himself in the position of the young man who was given a sample of tea to test, and who reported with a great show of assurance that he found it to contain a large quantity of H_2O and a substance having the formula H. A. Y.

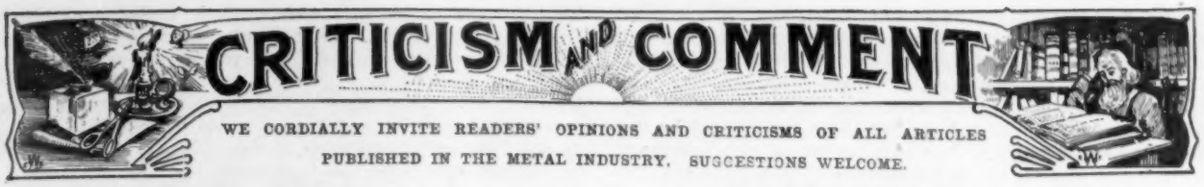
UNIFORM PRICE FOR COPPER.

There has been considerable comment and speculation in the daily press relating to the recent meetings held by the largest copper producers. The general idea seemed to be that an effort was to be made to form an agreement between producer and consumer whereby a uniform price standard would be adopted. Furthermore it was stated that the new agreement would be similar to that put into force by the recently organized Iron and Steel Institute relating to iron and steel.

We started to investigate and found that nothing was further from the thoughts of the producers, the meetings being held with the idea of continuing the collecting and publishing of certain data concerning copper production, which was done until up to the death of John Stanton several years ago.

We also discovered that there was no existing agreement in the iron and steel industry regarding the selling price of iron and steel. The Iron and steel Institute was formulated and organized by Judge Gary, chairman of the board of directors of the United States Steel Company, with the idea of promoting publicity as to methods of production, etc. One banquet was held at which the matter was brought up and it was brought out that the proposed ground was now covered by the proceedings of the American societies of Mechanical and Mining Engineers. The matter was dropped and the Iron and Steel Institute appears to exist for social reasons.

We have endeavored to get an expression of opinion for and against this standard price idea as regards copper, but so far have succeeded in hearing from only one large consumer of the metal. We publish his letter in our Criticism and Comment column and it needs no comment.


CRITICISM AND COMMENT
WE CORDIALLY INVITE READERS' OPINIONS AND CRITICISMS OF ALL ARTICLES
PUBLISHED IN THE METAL INDUSTRY. SUGGESTIONS WELCOME.

NEW BOOKS.

ALLOYS (NON-FERROUS).

By A. Humboldt Sexton, F. I. C., F. S. C., professor of metallurgy in the Glasgow and West of Scotland Technical College. 8 vo., VIII and 283 pp., 137 figures. Price $2.00. The Scientific Publishing Company, Manchester, England.

The purpose of this book, as stated in the preface, is to bring together into one volume the results of researches that are scattered through various technical journals and thus inaccessible to the general reader. This has been accomplished in a very satisfactory manner, and metallurgists and manufacturers of non-ferrous alloys will find themselves well repaid by an examination of the volume. Much of the data given has been collected from American sources, and the figures of the Steele-Harvey and Rockwell furnaces have a familiar look. The omission of the Schwartz furnace from the number of oil furnaces and a lengthy description of the Lunkenheimer furnace shows that the author is not familiar with the relative popularity of the various oil furnaces.

Aluminum bronze, which has very little commercial application, is described at length, more than twelve pages being devoted to it, while manganese bronze, which has numerous and important commercial applications, is dismissed with a scant two pages.

In the chapter on nickel alloys no mention has been made of the remarkable properties of the Monel alloys. The various alloys that are being so widely used for the manufacture of resistance wires, such as constantan, manganin, etc., are not referred to either.

The Admiralty test for ascertaining the purest brands of ingot copper, while interesting, is certainly not to be compared in efficiency with the method of ascertaining the conductivity of the copper by drawing into wire and comparing with a standard bar. The Admiralty test may, however, prove useful for those who have not the facilities for making the conductivity test.

Perhaps the most interesting and valuable portions of Prof. Sexton's book to the practical founder, are the numerous freezing point curves. By a study of these curves the founder can understand the varying results and fractures obtained by pouring alloys at varying temperatures.

The chapter on the preparation of alloys is very satisfactory and describes methods of practice that are standard.

It is to be regretted that the scope of the work does not admit of more space being devoted to the more important alloys. The book, as a whole, gives a synopsis of the more important work that has been recently done, and while disappointing in many respects; yet it is undoubtedly the most up-to-date presentation of non-ferrous information that is available and as such will have a wide circle of readers. J. L. J.

BUYING COPPER, UNIFORM PRICE.

To the Editor of The Metal Industry:

We beg to state that not being familiar with the agreement to which you refer to as having been arranged in the iron and steel trade through the American Iron and Steel Institute, we are not prepared to answer your inquiry intelligently. We have always thought that some sort of an arrangement between the producers and consumers which would tend to maintain a uniform price or nearly so, in the copper market, would be very beneficial for both buyer and seller.

Marked fluctuations in the price of copper are very bad especially for the consumer from every point of view, working great hardship upon them in the case of decline, so that in our opinion any arrangement that could be made between producer and consumer which will result in maintaining something like a uniform price and prevent market advances or declines, would we are sure, be welcomed by the trade generally.

The Detroit Copper and Brass Rolling Mills.
Detroit, December 26, 1908. L. H. Jones, President.

THE ADVANCE IN PLUMBAGO PRODUCTS.

To the Editor of The Metal Industry:

Your understanding that the plumbago market had a sudden rise is quite true. It is not, however, in a settled condition at the present time. The fact that foreign interests bought steadily during the year 1908 and American interests bought nothing worth mentioning seems to us a satisfactory reason for a sharp advance when American buyers enter the market for supplies. This is what happened in October last.

The Singhalese are a very shrewd people. They have dealt in plumbago for more years than our industries have used it. They keep themselves well informed of American conditions, and are not to be misled as to the quantity of plumbago which the manufacturers in this country will need for a given period of time. This knowledge enables them to prepare for the demand when it comes, and take a human advantage of such demand.

In our opinion it would be well for everybody to understand that the manufacturers of crucibles and plumbago products are now, and will be, obliged to pay much more for plumbago than in the past, and that any reasonable increase in the price of these products is fully warranted. Henry W. Peabody & Co.

New York, January 6, 1909.

THE ANALYSIS OF BRASS.

We quote the following from the concluding remarks of a four-page article by Mr. Albert J. Hall, entitled "The Complete Analysis of Brass," appearing in the November issue of Electrochemical and Metallurgical Industry:

"The details of analysis are given in full for the benefit of many a man who is called upon to make the determinations without any practical experience in this one line. It is the firm belief of the writer that any man with a common amount of technical training and reasonable ability can make the complete analysis of brass with accuracy without having to look up any references."

If the author of the article referred to is sincere, he deceives himself. Whether he is sincere or not, his concluding words may deceive the embryo chemist and those who are tempted to pin their faith to the work of an inexperienced analyst because his services are cheap.

The startling intimation that an inexperienced man could make the complete analysis of brass with accuracy merely by reading and following the directions given by Mr. Hall, aroused the suspicion that the author had, to say the least, overstepped the bounds of conservatism, and we examined the article with some care. We found that the author, throughout the article, is undecided in his own mind as to the class of people he is addressing. He assumes by turns that the reader is an ignoramus and a chemist of experience. He goes into the minutest details over the filtration and ignition of a lead sulphate precipitate, and farther on assumes that the reader knows how to prepare a standard ferrous sulphate solution without any directions. The would-be chemist, supposed to be ignorant of the fact that the operation of filtering is accelerated by having the filter paper fit the funnel exactly, and ignorant too (supposedly) of such well-known methods as the gravimetric determination of lead as lead sulphate and Low's iodimetric method for copper, is yet expected to be able to calculate the results of analyses without factors and without reference to any book. The chemist, apparently, is not expected to use the magnet on a sample of brass filings, to remove iron chips, except when the iron determination is to be made, although the presence in the sample of foreign matter, such as iron chips from the drill, will affect the accuracy of any determination made on the sample.

In describing the electrolytic method for copper, Mr. Hall directs that the cathodes be washed in alcohol, dried in an oven, and cooled in a desiccator, evidently ignorant that the desiccator for electrolytic copper determinations is unnecessary and a

waste of time, and that the best way to dry a cathode is to ignite the alcohol adhering to it after washing, waving it in the air while the alcohol burns, and then to move the cathode rapidly back and forth in the flame of an alcohol lamp.

For accuracy and neatness of execution, his distillation method for arsenic in brass does not compare with the method by precipitation with nitrate of iron and ammonia, and subsequent determination as magnesium pyroarseniate. He gives the formula of ferrous oxide as "Fe_2O_3," and in describing the permanganate method for iron, inexcusably directs that the assay should be cooled after adding the mercuric chloride solution instead of before.

This adverse criticism might be further extended, but enough has been said to show that the article is neither as trustworthy nor as complete as the author believes. In spite of the sanguine impression which Mr. Hall seeks to convey, the beginner at analytical work will do well to remember that "there is no royal road to learning"—that he cannot hope to become a successful analyst without traversing the rough and toilsome path pursued by his predecessors. For instruction he should have recourse to the standard authorities—Hillebrand, Talbot, Brearley and Ibbotson, Blair, Low, and the like—until he has learned to discriminate between an authoritative article and a garbled rehash.

Finally, those who make use of chemical analyses—the rolling mill man, the foundryman, the brass goods manufacturer—are warned against the idea that an unsupervised novice can, by following printed directions, obtain accurate analytical results. In the chemical laboratory, as in the shop, the mill, the foundry, and the office, experience and skill count as well as education. On account of the unfamiliarity of the brass works superintendent with analytical chemistry, he is tempted to get his analytical work done at the lowest price. But he should bear in mind that because of this very unfamiliarity of his, he is obliged to accept the results of the laboratory on faith. He should therefore place his work in the hands of a chemist of experience and of known reputation in metallurgical analysis. Reliable results are worth what they cost—unreliable work is worth nothing.

EXPERIENCE.

CLEANING NICKEL ANODES—A REVIEW OF THE SUBJECT.

TO THE EDITOR OF THE METAL INDUSTRY:

The storm of protest and denunciation brought forth by my letter on "Cleaning Nickel Anodes," published in the November METAL INDUSTRY, is, to my mind, a great deal like political mud slinging, and as such is scarcely deserving of an answer. I feel it necessary, however, in justice to myself, to correct some erroneous ideas and absolute misstatements made by some of my criticisers.

Mr. Gilchrist, unfortunately for his argument, made an absolute misstatement of my figures when he interpreted .0169 grs. as .0169 grains. The terms grs. was intended to express grams (metric system) and I have found that grains are usually expressed by grns. I should have expressed my figures by writing the word in full, but as I never use any but the metric system it did not occur to me that anyone, making accurate determinations of weights, would use the old system. In technical work the metric system is, of course, used exclusively and sooner or later the plater will swing into line and use that system.

In his claims for accurate micrometer measurements and accurate anode tests, Mr. Gilchrist fails to be in the least convincing. His statement that he obtained nice deposits is utterly aside from the point at issue and my remarks about the inaccuracy of his tests are ignored. I would like to ask Mr. Gilchrist again how he made his tests, did he use the same piece of copper for each succeeding anode test, how did he make his micrometer measurements, and has he tried his tests, starting with clean anodes that have been worked for some hours and then substituting dirty anodes? Answers to these queries will no doubt prove instructive. For the benefit of those who do not understand the value of a micrometer, I would remark that as the result of many tests on Standard Micrometers (with vernier) measuring to ten thousandths of an inch, the following facts are worthy of note: With selected first grade micrometers, hardened true and polished steel surfaces, and used by expert mechanics, the error was from correct to .00015" under. With ordinary micrometers and ordinary operators (accustomed to use of such instruments) the error was +.0001" to —.0005". Further, tests on flat iron bars gave errors in measurements (due to uneven surfaces and lack of parallelity of the two surfaces) of +.0005". With regular operators on unpolished stock, taking measurements in exactly the same place, the error was +.0006" to —.001". Also, there was a variation in taking readings of +.00005". Checks on micrometers reading in thousandths only, showed errors double the above in nearly all cases. Now the point I make is this: Mr. Gilchrist claimed that by cleaning anodes he had to increase his time of plating from 3 mins. 45 secs. to 4 mins. 5 secs. to obtain .001" deposit. Assuming a constant rate of deposit, he obtained in 20 secs. a deposit of .0001". Even assuming he measured the steel band in the same place before and after plating, a glance at the above facts will prove how much faith can be placed in his tests. Now did Mr. Gilchrist use an accurate micrometer, is he an expert in its use, and did he always check the same place in his steel bands before and after plating?

With regard to cleaning a 1,100-gal. tank, I agree that it would be more difficult than cleaning 200 to 400-gal. tanks (customary size), but the fact that it is difficult would act as an incentive to most men to develop some latent ingenuity without too great an expense to their employers.

Regarding rolled and cast anodes, I would refer to an article by Mr. Albert J. Hall on "Reactions in Nickel Plating," published in the October number of THE METAL INDUSTRY, pages 314-315. In this article Mr. Hall remarks: "The proportion (of waste nickel anodes in new anodes) has become so great that the cast anodes are less and less in demand." Both Langbein and Watt & Phillips seem to have an idea of the value of pure nickel anodes, whether rolled or cast. The principal reason rolled anodes are less soluble is because they are nearly always pure while cast anodes contain large percentages of iron and sometimes tin and copper to make them dissolve more readily.

"Our brothers on the other side of the pond" have undoubtedly progressed in electroplating as emphasized by recent patents. Cowper-Coles has certainly achieved success in electrodeposition and Classen has patented a process for obtaining bright nickel deposits that is worthy of remark. French firms have on the market bright nickel salts that give a nickel deposit of such a color that the material cannot be distinguished from the best nickel buffed material. They have also perfected solutions (used cold) for cleaning iron and other metals, at the same time depositing copper. I should say most emphatically that the English, French and Germans have shown as much, if not more, progress in the art of electro-deposition than we have in America, and also they are not tied down by old methods and trade prejudice against suggested improvements from electrochemists.

Mr. Blassett does not know the function of a corroding salt, although to my mind the name explains itself. Such a salt, usually a chloride and preferably sodium chloride (common salt) as it is very cheap, corrodes or dissolves the anode and also gives the electrolyte higher conductivity, thus decreasing the voltage. No one can question the value of such an addition to the electrolyte. It is also advisable to add boric acid, as by so doing the deposit is greatly improved.

The fact that corroding salts have not come into common use is lamentable and indicates that we are not as up to date as we might be. The Germans have used such salts for some time. Corroding salts make possible the use of pure nickel anodes, rolled or cast (pure nickel being practically insoluble in double nickel solutions), and we cannot object to cutting down the iron in anodes, thus appreciably benefiting our nickel deposit. I have been trying to imagine how Mr. Blassett can let his "sludge" get so thick in his tanks that the work nearly touches it without stirring up the sludge and thus circulating it through the solution.

I can assure Mr. Blasset that anodes may be removed from the solution one at a time without causing trouble. He should remember that I am speaking of anodes that are cleaned regularly, such anodes are covered with a brown slime (containing basic iron) which does not pass into the solution and is readily removed with a brush. There are no particles that can fall into the solution by such handling, and anodes which are in the condition to which he refers are, in my opinion, in the worst kind of condition for obtaining efficiency in the plating tank.

Mr. J. Anderson's fair-minded letter was extremely interesting and worthy of consideration. I feel as he does about obtaining facts, and giving conditions of tests. It has always been my custom when referring to nickel plating to mean only the highest quality of finish and not to include "nickel dipping" or "flash

plating." As a rule, I believe the expression "nickel plating" is intended to refer to a highly buffed, durable nickel finish.

My chief experiments have been made with the double and single sulphate of nickel, the former used at a density of from 5°-7° B. and the latter at 14°-15° B. The chlorid of nickel has some advantages (readily soluble and can be made up to a higher density than the double salts), but they are offset by the disadvantages when compared with the sulphates. I have both single and double nickel solutions and the best results are obtained with boric acid present in the electrolyte.

As a matter of interest and explanation, I will give below the results of two tests which I conducted recently. For these tests I used test plates of definite size which were weighed before and after plating. These plates were suspended on racks with regular material and always in the same position and were fastened with the same size of copper wire. The plates were of the same dimensions and nearly the same weight (possibly .5 grams difference). The area of each plate was accurately determined.

Test No. 1. Made in a double nickel solution at a density of 7° B., temperature 81° F., volts 2.2, time plated 1 hour, amperes per square foot of cathode surface 3.36, proportion of anode area to cathode area 2 to 1, distance from anode to cathode, 9½", nickel deposited per square foot of cathode surface, 4.08 grams.

Test No. 2. Made in a single nickel solution at a density of 15° B., temperature 70° F., volts 3.2, time plated 1 hour, amperes per square foot of cathode surface 4.78, proportion of anode area to cathode area 2 to 1, distance from anode to cathode 9½", nickel deposited per square foot of cathode surface 6.019 grams.

Note.—The anodes for both tests were of cast nickel well cleaned, and the solutions also were well cleaned. The actual amount of nickel deposited was directly determined by weighing the test plates and figuring the weight (the area being known) to grams per square foot of total cathode surface. The test which Mr. Gilchrist misinterpreted was made in the same manner as the above. The question may arise as to whether the nickel deposit on the test plate shows the average uniform deposit on the main load. I do not claim this to be a fact, but I find a test plate more accurate than direct determinations on the material (which is sometimes of such a character that some parts receive less nickel than others; i. e., tubes, etc.). By using the same metal for the test plate as is used in the tank loads, and the test plates being of uniform size and weight, using the same method of suspension and hanging the plate in the same position on the rack (irrespective of the form of rack or kind of material used), I find that extremely accurate tests can be made. I have conducted such tests on the same day under identical conditions and have obtained absolutely uniform results. As the electrolytes are always cleaned and are thoroughly stirred every night, the deposit at the top and bottom of the tanks is very uniform.

The reason why I have given so much space to the test is to point out the necessity of covering as many of the variable conditions as possible. No test is of value unless every condition is accurately known and recorded. The above tests were made with accurate ammeters and voltmeters and with the finest laboratory balances and every condition was carefully studied and recorded. The test which I gave above are merely examples of many similar tests of which I have records.

The length of this letter is greater than I anticipated and it may seem that I have gone into unnecessary detail, but detail is essential to a proper understanding of the subject. I trust that this letter will merit reply and further literary pyrotechnics from my well-appreciated criticisers.

New York, December 30, 1908. PERCY S. BROWN.

A REVIEW OF FOREIGN METAL PUBLICATIONS.

PROTECTIVE COATINGS FOR METALS. A NEW PROCESS.

An article in the *Electrochemische Zeitschrift* (Vol. 15, page 130) describes a process for metal plating which has been successfully operated by the Metall Anstrich Syndikat of Berlin. The metal or alloy with which the object is to be coated is first reduced to the form of a fine powder and is then made into a thin paste and is brushed or sprayed upon the clean surface of the metal. After the coating is dry it is fused on to the underlying surface by placing the article into a coal or coke fire or by simply applying the flame of a blast lamp. The protective coating, which may consist of either pure tin or of an alloy of lead and tin, or of lead, tin and zinc, adheres without difficulty to articles of copper, brass, bronze or lead, but in the case of objects of wrought iron, cast iron or steel it is necessary first to plate the article with copper. Only a thin film of copper is needed and it may be most conveniently produced by painting the surface with a dilute solution of blue vitriol. Well adhering deposits of tin were obtained on cast iron thus treated, whereas it was not possible to produce a satisfactory coating by dipping the object into the molten tin or alloy in the ordinary way.

The finished coatings obtained as described above are not smooth and are not suitable for polishing or burnishing. In order to overcome this difficulty it is only necessary to pass a bristle brush or wad of oakum over the surface of the coating while it is still in the molten condition.

One of the advantages of the above process as compared to electroplating lies in the ease with which coats may be applied to certain sections or parts of large machines and metallic structures not readily handled.

According to an article by Th. Geilenkirchen in Stahl und Eisen, aluminum, sodium and magnesium are rapidly coming to the front in Germany as deoxidizing materials for the production of sound castings. These agents are of use especially when the metal has cooled off too far to allow the addition of ferro-manganese and ferro-silicon to the casting ladle. From 0.02 per cent. to 0.05 per cent, of aluminum is sufficient, while magnesium is still more energetic in its action. The addition of 0.07 per cent. of magnesium resulted in one case in an increase of 50 per cent. in the tensile strength of the iron. A mixture of equal parts of calcium and aluminum has also been used with considerable success.

It was not many years ago that the custom still prevailed in Germany and some other European countries of making keys five and even six inches in length. In olden times it was not uncommon for the keys of buildings to be twelve to fifteen inches long and to weigh two pounds or more. But recently the old belief that the safety of a lock depended largely on its size has been discarded, and the Germans now prefer the locks with small, flat keys of the type long in use in America.

For the old-fashioned keys iron was the metal exclusively employed, but for the new keys it is necessary to have some metal which will not rust or wear too rapidly. According to the Deutsche Metall-Industrie-Zeitung, 1908, page 527, the requirements which such a metal must fulfill are very severe. The manufacturers of some of the best German locks have recently adopted an alloy of the following composition as being the most satisfactory:

Copper	65.16%
Zinc	20.51%
Nickel	12.67%
Lead	1.10%
Iron	0.41%
Tin	0.15%

The lead is very important in order to keep the metal from being so tough that it cannot be easily worked. A larger percentage of nickel than 12 per cent. also makes the metal hard to work. The tin seems to have no effect on the properties of the alloy, but the iron increases its hardness and lends it other valuable properties

Shop Problems

IN THIS DEPARTMENT WE ANSWER QUESTIONS RELATING TO SHOP PRACTICE OF THE METAL INDUSTRY. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

ALLOYING

Q.—We are making aluminum castings in iron chill molds, but have difficulty with the shrinkage. Can you suggest an alloy that we could use to obviate this?

A.—Zinc alloys with aluminum more naturally than any other metal; alloy of two-thirds aluminum and one-third zinc has much greater strength and less shrinkage than pure aluminum. To successfully use chill molds on any but very plain castings, the molds must be made in a great many parts and this makes them very expensive.—J. L. J.

MIXING

Q.—Would like to have published a good formula for making light brass castings, used for pump trimmings, such as plunger cagés, etc.; one that runs sharp and close and at the same time is strong and cheap.

A.—"Hydraulic metal" and skin dried molds ought to prove more satisfactory for this work than anything else. The mixture is copper, 100; tin, 10; yellow brass, 25. Pour into ingots and remelt. The fumes or smoke arising from yellow brass is due to the zinc burning from contact with the air. A shovelful of sand will keep out the air and the pot should not be skimmed until just before pouring.—J. L. J.

Q.—Will you kindly publish mixture for good yellow brass that will run sharp; also a mixture for red brass that will be hard and free turning for making such things as large bushings weighing 250 pounds, etc.?

A.—The following is a good yellow brass mixture:

Copper	70
Zinc	24
Tin	3
Lead	3

A very satisfactory red brass for bushings contains:

Copper	87
Tin	5
Lead	5
Zinc	3

If a harder alloy is required, the well-known 88-10-2 mixture may be used, but it does not machine so freely.—J. L. J.

Q.—I would like a mixture for bearings to be used in a rolling mill. The rolls get very hot and the present bearings break.

A.—Rolling mill bearings have never received the attention from designers that they ought to receive. Standard phosphor bronze and plastic bronze are largely used for such bearings in the Pittsburg district. Both are excellent bearing metals but have no great strength, especially when very hot. Hence the bearings are liable to break unless made very massive and heavy I should recommend for such situations a hollow, water-cooled bearing cast from manganese bronze and lined with a babbitt compound of tin, 83 1-3; copper, 8 1-3; antimony, 8 1-3. Such bearings have been designed for some of the government torpedo boat destroyers.—J. L. J.

RECLAIMING

Q.—What is the best method for obtaining gold from old solutions?

A.—If the solution contained cyanide the gold may be recovered by evaporating the solution to dryness, mixing the residue with litharge and putting in a sand crucible. The gold will be collected in the lead button and when the lead is dissolved away in hot nitric acid the gold remains behind as insoluble spangles which are filtered off.—J. L. J.

CASTING

Q.—How would you advise me to fit up for casting small pieces in Britannia or white metal?

A.—You will find brass molds very satisfactory. The molds should be smoked to prevent the metal adhering to them. It is often necessary to cast a complicated article in a number of different parts and afterward solder them together.—J. L. J.

Q.—Can you give me a remedy for the blowing of yellow brass when there is an iron chill cast in the piece. The casting is a light handle with a 5/16 iron chill?

A.—A light casting, such as the one referred to, is very likely to blow when there is an iron chill in it. The best plan to pursue with such work is to leave the mold open until just before pouring, then put the chill in place when hot, close mold and pour. The reason that yellow brass castings are likely to be spongy is owing to the fact that yellow brass is not very fluid when melted and for this reason does not readily free itself from dissolved gases.—J. L. J.

Q.—You may be able to enlighten me on a point relative to the melting of gold for jewelry. I have considerable trouble with blisters and pin-holes.

A.—Your trouble is no doubt due to dissolved gases which molten gold readily absorbs. Allowing your metal to "soak in the fire" or using a coke high in sulphur may be the causes of the trouble. The use of steel molds, warmed and given a thin coating of japan wax, is recommended. If molds made from open grained cast iron are used, pin-holes in the ingots may result from the escape of the air held by the spongy iron or from the gases produced by the oxidation of the graphite.—J. L. J.

Q.—We experience difficulty in casting an alloy containing 10 lbs. copper, 1 lb. tin, and 7 ozs. lead and with similar alloys. We use new metals only and the first castings made are of the proper hardness, later castings get harder without any change in the alloy. Can you suggest a remedy?

A.—It is likely that your mixture becomes more or less oxidized on remelting and that the tin segregates, forming hard spots. The addition of 5 ozs. of zinc ought to give a more homogeneous alloy and at the same time deoxidize it.

When fine castings are to be made a black lead stirrer should be used. If iron-stirring bars are used enough iron may be taken up by the metal to harden it very considerably.—J. L. J.

LINING

Q.—We require a lining to use on iron crucibles for carrying molten aluminum, and should be obliged if you could help us.

A.—Grecian magnesite that has been well burned and ground will make a good crucible lining. It is mixed with molasses to form a paste. This is applied as a lining and then slowly heated to redness. If any cracks form they are filled with the paste and the crucible again baked. A magnesite lining does not give up any iron, silicon or other impurity to the molten aluminum.—J. L. J.

CONVERTING

Q.—Please tell me how to convert 40 lbs. of shot copper into the carbonate and how much of the latter should be obtained?

A.—Metallic copper cannot be converted directly into the carbonate of copper. It must first be changed to some such salt as the sulphate. If 40 lbs. of sheet copper are acted upon by dilute sulphuric acid the copper will be dissolved and the copper sulphate may be crystallized out. It contains 40.46% of copper, hence 40 lbs. of sheet copper will make 98.8 lbs. of copper sulphate. If this salt is precipitated by the addition of carbonate of soda, carbonate of copper will be formed which contains 57.35% of copper and hence 69.7 lbs. of carbonate of copper can be obtained from 40 lbs. of sheet copper.—J. L. J.

MOULDING

Q.—Please publish a formula for making a mold wash that can be used for nickel castings without skin drying.

A.—A mixture that is used in steel foundries and which ought to give good results on molds for nickel castings is made as follows: Ground rosin is dissolved in benzine or denatured alcohol and to this is added silica flour. This mixture is sprayed or painted on the surface of the mold and ignited before casting.—J. L. J.

Q.—We should like advice as to the best mixture and material to be used in making what we call a "match" or hard half-side of a mold in brass casting.

A.—The following mixture has proved very satisfactory:

Pulverized litharge	3 parts
Boiled linseed oil	7 "
Sifted iron or steel borings	1 "
Gangway (burned) sand	89 "

Mix litharge, borings and sand dry, then add oil until temper of ordinary molding sand is obtained.—W. J. R.

TEMPERING

Q.—Can you tell us the best way to temper steel springs in large quantities as per sample enclosed?

A.—Springs like the sample are tempered by a continuous process. They are placed on a conveyor which carries them through a heating furnace in which they are heated to the tempering heat and then dumped into a tank of fish oil. The excess of oil is "flashed off" and the temper is drawn by placing in an annealing furnace and heating to 650 degrees F., after which the springs are allowed to cool slowly. The requisite furnaces may be obtained from any gas furnace manufacturer.—J. L. J.

DRAWING

Q.—What should be the speed for drawing copper wire from ¼ inch to the various smaller gauges. Also the speed for brass wire?

A.—Speed for drawing copper wire should be as follows:

From ¼ inch to No. 8 (.128 inch), 750 feet per minute.

From No. 9 (.114) to No. 14 (.06 inch), 900 feet per minute.

From No. 14 to finer numbers, 1,000 feet per minute.

Brass wire as follows: For the larger sizes, 350 to 500 feet per minute according to the strength of the alloy. No. 9 to 14, from 600 to 750 feet and the finer sizes about 900 feet per minute.—A. W. L.

BRAZING

Q.—We would like an easy flowing brazing brass.

A.—An easily fusible brazing solder can be made by melting a good quality of sheet brass, 1 part by weight, and when perfectly fiuid adding ¾ to 1 part of sheet zinc. To reduce to granules pour the molten metal into water in a slow stream from a height of 4 or 5 feet.—C. P.

GALVANIZING

Q.—Please give me the following information if possible through the columns of your paper: Can wire cables be galvanized so that they will never rust? If so, please state the method employed. I am desirous of making steel wire cables for lightning rods.

A.—Wire cables can be galvanized so that they will last a great many years. This galvanizing is done by a method called "sherardizing." There are several companies now performing this operation who probably could do this work or would give you directions for doing it.—W. L. C.

Q.—We are mailing you two pieces of galvanized flat steel wire. This wire, after being galvanized, is formed into a flexible tube. Sample marked 1 will stand this forming, but on 2 the zinc flakes off. Can you give us any idea what causes this and how to prevent it? What is aluminizing?

A.—Part of the difficulty is due to difference in steels, as sample number 1 is of smoother and softer stock, enabling a more thorough cleaning and preparation of the steel with the same effort and insuring greater adhesiveness. If obliged to use the steel in number 2, have same more thoroughly scoured and brightened before coating. Also do not coat as heavily, as a thin coating will withstand the forming better. Aluminizing is the term used by one of the users of the electro galvanizing process for coating steel wire, corset steel, etc., as the name for the coating which contains some aluminum.—W. L. C.

TINNING

Q.—I am constantly having trouble with my pot tinning and I want to get the result as per enclosed sample. You will notice, although it has been in use some time, it still has a beautiful appearance inside. Will you kindly give me full directions for obtaining this finish?

A.—Plunge the work in kerosene oil before cooling in the water. A little practice in shaking the work properly while in the oil will enable you to obtain the result desired.—W. L. C.

Q.—I would like to know if you can give some advice with reference to mixing tin and lead in the ordinary process of tinning small articles. I have found that by putting in from 25 to 30 per cent. of lead, the color is not damaged and the articles themselves stand the weather just as well, but, however, I am troubled with a greater oxidization of the tin which thereby makes the process as costly as if it were pure tin.

A.—Lead mixed with tin is decidedly more economical than the pure tin, and if your goods are not subjected to comparison for appearance with goods coated with the pure tin or if they are not used for cooking or culinary purposes where lead would endanger the health of purchasers, you will have little trouble in using the mixture. Lead does not appreciably increase the drossing of tin with which it is mixed, but depreciates the value of this dross to refiners. Goods coated with pure tin and those coated with the alloy can be readily distinguished after a short period in stock, much to the disadvantage of the latter, and salesmen have no difficulty in showing the superiority of tin-coated goods if handling the same in competition with goods coated by the cheaper mixture.—W. L. C.

CLEANING

Q.—We note in one of your recent issues a reference to the use of a "boiling solution of platers' compound." This occurs in answer to a question by one of your correspondents. Will you kindly advise us what this platers' compound consists of?

A.—Platers' compound consists of a neutral soap sometimes called whale oil soap, at other times platers' compound. It has been used for years in cleaning polished metals by boiling them in a solution consisting of 4 to 6 ozs. to the gallon of water. Very dilute solutions are used in assisting the drying out of articles when plated, as it helps to avoid water stains and saves sawdust materially.—C. H. P.

DIPPING

Q.—Can you confer a great favor upon us by publishing the formula of the solution necessary to obtain a steel dip effect on brass? This is a sort of dark nickel color.

A.—For a steel dip for brass the following formula gives good results:

Water	5 gallons
Muriatic acid	1 pint
Powdered white arsenic	½ oz.

To prepare the dip, heat the acid to 150 degrees and then add the arsenic; when dissolved add to the 5 gallons of hot water, maintain the solution at 150 degrees or more. Polish or acid dip the articles as desired and cleanse in the usual manner; a few seconds' immersion will produce the steel color. If a darker tone is desired add ¼ oz. liver of sulphur. To maintain the dip in working order add arsenic dissolved in muriatic acid as occasion requires it and a little liver of sulphur for the darker tones.—C. H. P.

FINISHING

Q.—Will you kindly tell me how to obtain the finish like that on enclosed sample?

A.—The sample submitted is known as the architectural

bronze finish. To produce the finish proceed as follows: Remove fins and burrs and if the surface is free from sand, cleanse and scratch-brush, otherwise acid dip in the usual manner. Now prepare a hot solution of sulphuret of potassium at least 4 ozs. to the gallon. Maintain the heat constantly while in use. Immerse the scratch-brushed articles in this solution for a few seconds until a deep golden color is produced. Remove and wash in cold water, then pass through a 3 to 5 per cent. solution of muriatic acid and water. The yellow immediately turns to a deep bronze. Rewash, scratch-brush lightly wet, using a little sal soda in the brush water. Rewash, immerse rapidly in the sulphuret solution. Again wash, dry out, sand blast if necessary and lacquer. Do not use copper wires for stringing in coloring, as the sulphide produces a dark effect around the small hole.—C. L. P.

COLORING

Q.—How can we obtain a good dark-green gold color to use in connection with rose for two-color work. And what is a good stop-off varnish?

A.—The dark antique green gold is produced by first preparing the articles for coloring in the usual manner; then coloring them in a solution consisting of:

24k. gold	3	dwt.	per gallon
Fine silver	1	"	"
Lead carbonate	1	"	"
Potassium, cyanide	6	ozs.	"

In making the solutions the gold could be dissolved in two parts hydrochloric and one part nitric acid, after which it is precipitated with ether and after washing, added to the cyanide solution or, by suspending an anode on the positive wire and porous jar containing a carbon anode on the negative wire, and running a full current until the required amount of metal has been dissolved off. Use the solution cold with a small intense current of from 8 to 10 volts and 12 to 25 amperes until the desired color is obtained. Rub off the high lights, then stop off with gum copal dissolved in acetone.—O. A. H.

PLATING

Q.—Please give me a formula for producing a black on brass as per sample sent you.

A.—Here is the formula for one of the best immersion solutions. The solution can be used nearly cold:

Carbonate of copper	¼ lb.
Warm water	1 qt.
26% ammonia water	½ gal.
Sal soda	4 ozs

To prepare the solution, dissolve the copper in the ammonia, then add the water and soda; mix thoroughly. Wash the articles after coloring thoroughly and set the black by immersing in a warm dilute solution of caustic soda, 2 to 4 ozs. to the gallon; this will increase the lustre of the black after washing and drying out; the articles should be lacquered in the usual manner.—C. H. P.

Q.—Would you kindly publish the details for a method of a cheap tin solution or dip? I have some iron work that I wish to tin plate.

A.—A cheap method of electro tinning for iron articles consists of preparing a solution of 4 ozs. of cream of tartar and ½ oz. of chloride of tin in each gallon of warm water. Use anodes of pure tin, not tin plate. A medium current should be used and the anode should be arranged so the articles are completely surrounded. A good coating can be obtained in a short time. For a bright deposit scratch-brush dry using a steel wire scratch-brush. Of course the articles must be previously cleaned in the usual manner.—C. H. P.

Q.—I am looking for a good silver solution formula, one that will plate smooth and white on steel and brass.

A.—The two following formulae for silver plating have given excellent results:

No. 1. For heavy silver plating.
Water, 5 gallons
Potassium, cyanide, (C. P.), 1¼ lbs.
Chloride of silver, 17½ ozs.

It is necessary to use 28 ozs. of nitrate of silver, precipitated as choloride by first dissolving in water, then adding common salts or hydrochloric acid as long as any precipitate is noticed. Then wash the precipitate a number of times until perfectly free from acid. For ordinary silver plating the following formula may be used:

Water, 5 gallons
Potassium of cyanide, 14 ozs.
Silver chloride, 3½ ozs.

To produce 3½ ozs. silver chloride use 5½ ozs. of nitrate of silver and proceed as above. In both formulas it is advisable where possible to boil the solution, replacing the water lost by evaporation.—C. H. P.

Q.—Can you advise me as to the best thing to do with my acid copper solution? My work consists of sheet brass in large pieces and it comes out streaked.

A.—The trouble with your acid copper bath is that it contains too little metal in solution for successful results. An acid copper bath should stand at least 15 degrees Baumé and not less than 1½ lbs. of sulphate of copper and 4 ozs. of oil of vitriol should be used in its composition. To produce a smooth deposit, 1 or 2 ozs. of any of the following substances are used, in a 5-gallon bath; dextrine, glucose or transparent gelatine. These substances are dissolved in hot water previous to adding to the bath. It has been recently proposed to add sulphate of aluminum to acid copper baths to produce a smooth, even deposit. This may also be added in the above proportions.—C. H. P.

Q.—Please publish the best method to use in overcoming hard nickel deposit. The deposit is practically too hard to polish.

A.—Your nickel solution is probably alkaline, due to the addition of ammonia or the constant excess of ammonium sulphate in solution due to the practice of using double nickel salts continually. Try adding single sulphate of nickel salts when strengthening your bath. In this manner your addition will be all metallic salt; continue this practice until the bath shows a deficiency in conductivity. This will be shown by the increased resistance in the bath or by dark lines appearing in the vicinity of the suspending wire frames or hooks. To increase the conductivity add commercial sulphate of ammonia rewashed, or 1 oz. of common salt will prove beneficial. A good formula to use in preparing a new bath is as follows:

Water, 5 gallons
Double nickel salts, 2¼ lbs.
Single nickel salts, 6 ozs.
Boracic acid 1 oz.

The current strength should be from 3 to 4 volts. A good uniform deposit can be had by the use of this formula.—C. H. P.

Q.—I am sending you a sample escutcheon which I have considerable trouble in plating. I use a cyanide copper bath and after oxidizing them they spot out. I should like to know where the trouble is and if we can avoid it. I would also like to know the best way to make an arsenic solution, plate black.

A.—Your trouble is due to the porosity of the castings. The solution is absorbed in plating or oxidizing and remains there. A method that is now being used to overcome this difficulty, is to immerse in a warm lacquer thinner for a short time before lacquering, and then lacquer in the usual manner by dip or brush. If you were to use an acid copper bath for your copper deposit, using only the cyanide bath for a flash, your trouble might be avoided. A black arsenic solution can be prepared by dissolving 1 lb. of white arsenic and ½ lb. caustic soda in each gallon of hot water, then add 1 oz. of cyanide; allow to cool before use. Use anodes of sheet iron. A strong current is necessary.—C. H. P.

Q.—We have an order to plate a lot of iron architectural and grille work a dark bronze. It is government work and the specifications call for a 5-hour plate in an acid bronze solution. Can you advise us how to make up such a solution?

A.—The acid bronze solution referred to in the government specifications is the regular acid copper bath, so you may proceed with your contract by using at least a 4½-hour deposit in this bath and then after plating, produce the desired tone by using a dilute solution of sulphide of barium in a small amount

of caustic soda. Probably the following proportions would answer:

Sulphide of barium, ¼ oz.
Caustic soda, ½ oz.
Water, slightly warm, 1 gallon

If you find the color too dark to match the solid bronze then you will probably have to plate the articles (after the acid bath) in a warm brass solution for half an hour so that a slight reddish tone is produced. Then use in the place of the barium sulphide yellow sulphide of antimony and mix in about the same proportions as mentioned above. The color in all cases is developed by scratch-brushing once by the wet method and finished by the aid of a dry finish. Sometimes finely sifted sea sand is used for the purpose; where scratch-brushing cannot be accomplished. If you follow the methods mentioned you will be fulfilling all requirements of the government specifications. You are no doubt well aware that it is impossible to deposit copper and zinc combined from an acid solution, or platers would not be using cyanide baths for this purpose.—C. H. P.

Q.—We shall be glad if you can tell us a way to get over a difficulty we are experiencing in nickel plating steel safety pins. The pins turn brown after drying out in the sawdust. We are anxious to know how to prevent this discoloration.

A.—Your solution is probably slightly alkaline, due to the constant employment of a strong current which produces free ammonia in solution. If your solution is composed of double sulphate of nickel, then prepare a mixture of equal parts of water and oil of vitriol and add one to two fluid ounces of this mixture to each one hundred gallons of solution. This will assist in maintaining neutrability. The addition should be made each evening. If your solution is in perfect condition, then your trouble may be due to your drying-out methods. In the United States it is customary to use a soap solution to assist in drying out all classes of metal goods. This solution is prepared from what is known in this country as platers' compound or whale oil soap. This is a black neutral soap and obtained at any platers supply house. The method of use is to produce a hot solution by adding half to one ounce of the soap to each gallon of water contained in an iron tank and kept at a temperature of 180 degrees by the aid of steam coils. After plating, the articles are washed in cold water, then immersed in the soap solution, removed and either dried out direct or again passed through boiling water and then dried in sawdust (maple sawdust given the preference). It will be a surprise to see how quickly the water runs from articles dried by the aid of this method and quite a sum of money saved in sawdust alone. Some concerns in the United States use a rapidly revolving platform for this purpose, holding several baskets used in the drying out. The platform is revolved at a high rate of speed and by centrifugal force the moisture is expelled and very little drying in sawdust is necessary.—C. H. P.

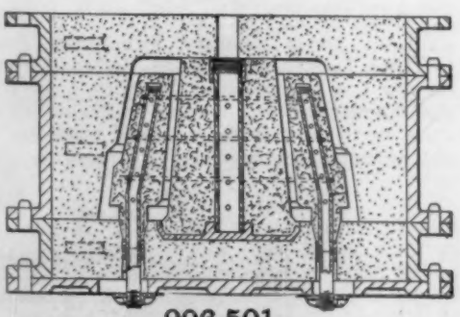
Q.—Would like whatever information you can give me referring to plating zinc on cold rolled steel.

A.—Zinc can readily be plated upon steel, observing the usual precautions in cleansing. The most simple solution in use consists of commercial sulphate of zinc, 2 lbs., water, 1 gallon. Prepare the solution and allow to stand for 12 to 14 hours with the anodes hanging in the solution. This helps to neutralize the solution. Afterwards add to each gallon of solution 1½ ozs. of sulphate of aluminum dissolved in as little boiling water as possible. The anodes should be of cast zinc. After cleansing the articles in the usual manner, immerse the articles in a dilute acid copper dip, consisting of 2 ozs. of sulphate of copper and 1 oz. of oil of vitriol to each gallon of water. This gives a slight coating of copper. Wash well and immerse in the galvanizing bath. A current strength of at least 6 volts is necessary for successful results. After working the bath for some time it will be necessary to cleanse the anodes for free action of the solution upon the surface and to assist in maintaining neutrality of the solution.—C. H. P.

PATENTS

REVIEW OF CURRENT PATENTS OF INTEREST TO THE READERS OF THE METAL INDUSTRY.

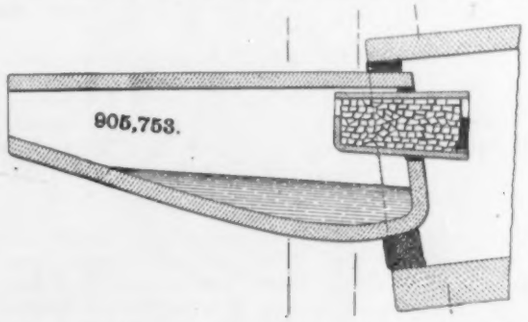
906,501. December 15, 1908. Sand Mold and Flask Therefor. William D. Berry, New Brighton, Penn., assignor to Brighton Brass and Bronze Company, Pittsburg, Pa. A sand mold and flask adapted especially for making water cooled tuyeres, or other tubular articles having hollow or cored walls. This device is intended to be made and assembled by unskilled labor and with the assurance that it will be properly done. By referring to the cut it will be seen that the apparatus consists of a cope, drag



906,501.

and intermediate portions providing the mold cavity, a center core in the cavity and extending from to to bottom, a perforated vent pipe in the center core with an opening through the cope in line with the pipe. A shell core surrounds the center core and has perforated pipes which extend down through holes in the drag and are secured at the bottom. These pipes hold the shell core in place and prevent it from raising when the metal is poured in.

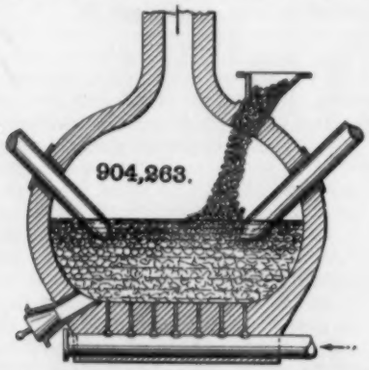
905,753. December 1, 1908. Process of Extracting Zinc. Edward H. Shortman, Bloxwich, England. In the process of extracting zinc, provision has to be made for the separation of the lead, that is usually present in the zinc vapors distilled over from the furnace retorts to the external retorts. Hitherto it has been the practice to interpose pieces of refractory materials within the mouth of the receiver in such a manner as to allow all of the zinc vapor to pass but to intercept the lead. The great drawback to this method has been that but one tapping



of high purity zinc could be made, because the intercepting medium became quickly clogged, and the receiver had to be removed to be cleaned. This invention obviates this difficulty by the use of coal or coke as an intercepting medium and the inner end of the receiver is provided with a fireclay receptacle, which serves both as a displaceable carrier for the intercepting medium and as a trap or intermediate receiver for intercepted lead. This arrangement permits of two "tappings"—and also allows of the removal of the medium at any stage of the process.

906,878. December 15, 1908. Machine for Drawing Tubular Articles. Isabel Harvey, Taunton, Mass. Administratrix of John H. Harvey, deceased. The principal object of this invention is to improve the construction of dies for drawing ferrules or similar tubular articles from sheet metal whereby the production is increased and the cost of manufacture reduced. The dies and plungers are so constructed as to cut a blank from a strip of metal, cup the blank and cut the bottom out of the cupped blank—forming a finished ferrule, all in one downward movement of the plungers.

904,263. November 17, 1908. Process of Obtaining Metals from Their Ores. Karl Kaiser, Berlin, Germany. This process consists of employing a furnace of the design shown in cut, the object being to obtain different metals contained in the same



ore, in a separate and particularly pure condition. The invention broadly consists in subjecting the ores to heat in an electric furnace, passing an oxidizing gas into contact with said heated ore and then passing a reducing gas into contact with the heated material.

905,785. December 1, 1908. Electrolytic Solution for Zinc Plating. Celestine Bianco, New York, N. Y. An electrolytic solution or bath, which is particularly adapted for plating metal articles of any description, with a coating of metallic zinc, for the purpose of protecting them against disintegrating oxidation. The improved electrolyte is composed of the following ingredients in the following proportions:

Zinc	50.	to	150	parts.
Iron	2.	"	15	"
Aluminum	0.5	"	10	"
Sodium	0.5	"	10	"
Sulphuric acid	80.	"	250	"
Acetic acid	5.	"	8	"
Water	886.5	"	527	"
	1020.00	"	1000.00	

Instead of using the single bodies—Zn, Fe, Al, Na, their oxids could be used in the combination, as the combined oxygen would react with the hydrogen of the acids to form water, while the composition of the electrolyte would practically remain the same.

905,232. December 1, 1908. Copper and Process for Purifying, Casting and Alloying the Same. August J. Rossi, New York, N. Y. An operation which consists in treating molten copper with titanium, with the idea of reducing copper oxide and therefore produce a sound copper casting. The resulting compound is a copper casting free from blow holes and containing not to exceed traces of titanium.

906,339. December 8, 1908. Composition of Matter Containing Alumina and Silica. Frank J. Tone, Niagara Falls, N. Y., assignor to the Carborundum Company, Niagara Falls, N. Y. A process for producing silicids useful for various purposes such as the refining of iron and steel. The fused alumina-silica material has a hardness equal to many grades of corundum, and is very tough. A mixture of kaolin iron and carbon are mixed together, in the proportions indicated in the following formula: $6\ (Al_2O_3, 2\ Si\ O_2) + 22\ C + 11\ Fe = (6\ Al_2O_3 + Si\ O_2) + 11\ Fe\ Si + 22\ C\ O$, and there is obtained an iron silicid containing 33 per cent. silicon and a fused residuum of alumina and silica containing about 9 per cent. of silica. Any ordinary form of arc furnace with vertical electrodes can be used.

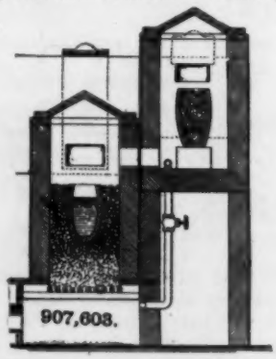
12,880. November 17, 1908. Alloy. Guilliam B. Clamer and Joseph G. Hendrickson, Philadelphia, Pa., assignors to Ajax Metal Company, Philadelphia, Pa. This invention covers the production of copper-tin-lead alloys for bearings, the manufacture of which consists in holding up all of a high percentage content of mechanically-held lead—more than twenty per cent. of the whole mass—by limiting the tin in the copper-tin matrix to below 9 per cent of the copper. This provides a matrix of copper and tin free from slow solidifying combinations and which in cooling solidifies quickly at a high temperature and thus holds up the lead, preventing segregation.

905,729. December 1, 1908. Welding Fluid. Vincenzo Massimino, Charleston, W. Va. This welding fluid is composed of the juice of the common wild form of lettuce and blue stone (copper sulphate) mixed together in the following proportions: Two pounds of lettuce and one ounce of blue stone are put into a press and squeezed; the resulting juice is used for welding copper wire. To weld, the ends to be welded are heated to the proper temperature and dipped in the juice. They are heated again and welded in the usual manner.

905,925. December 8, 1908. Refractory Material for Furnaces and Crucibles. William Rippey, Allegheny, Pa. An invention of a material for making the inside walls of retorts and all kinds of furnaces, also for the manufacture of crucibles. This material is composed of Portland cement and sand. The method consists in mixing sand, cement and water in varying proportions, shaping and heating until the incipient fusion of the sand begins, whereby the binding of the body is effected.

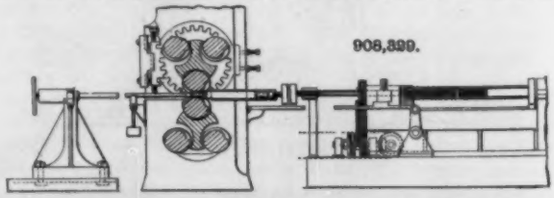
907,603. December 22, 1908. Brass Melting Furnace. Arthur C. Jackson, Philadelphia, Pennsylvania, assignor to Miller Lock Co., Philadelphia, Pennsylvania.

A furnace consisting of a primary and secondary combustion chamber, whereby the heat contained in the gases, which ordi-



narily is lost, is made to heat a second pot of metal. The furnace is designed to be operated under forced draft and for use with either coal, gas or oil. The general features can be seen by referring to the accompanying cut.

908,329. December 29, 1908. Manufacture of Metal Tubes and The Like. Henry Reinhard, Birmingham, England, assignor to Tubes, Limited, Birmingham, England. The invention relates to metal rolling processes in which a mass has to be pierced for the reception of a mandrel or like device, as in tube manufacture, or to the piercing of a solid metal bar into a finished tube when thick walled tubes are required. This patent



covers an improved method of piercing. The inventor claims method and means for piercing a mass of metal for forming a tube, comprising rotable housings, rolls mounted in the housings arranged to operate on the bloom longitudinally, a mandrel disposed in front of the rolls, a bloom guide situated behind, and a feed device having a pusher head of diameter less than the guide for feeding the whole of the bloom onto the mandrel.

905,281. December 1, 1908. PROCESS OF MAKING MANGANESE AND FERRO MANGANESE. Anson G. Betts, Troy, N. Y. A process for making metallic manganese, which consists in treating a slag containing iron and manganese with a reduction product of silica, and precipitating the iron, further treating the slag with a reduction-product of silica in larger quantity and thus separating the manganese.

908,002. December 29, 1908. MOLDING MACHINE. Charles Herman, Allegheny, Martin L. Heyl and Harry T. Franenheim, Pittsburg, Pennsylvania, assignor to Herman Pneumatic Machine Company, Zilienople, Pennsylvania.

A molding machine in which the mold formed within the flask can be jarred evenly and compactly and by a jarring means which will prevent any wabbling of the flask during the operation, and will enable a better distribution of the impact. The machine also is provided with means for performing both jarring operation and the raising and lowering of the flask and mold before and after such operation automatically.

907,274. December 22, 1908. METAL DIPPING MACHINE. Chas. F. Neurenther, Peru, Illinois. This is a machine designed to deliver into a mold or other receptacle a definite quantity of molten metal. It is specially adapted to the forming of zinc slabs for rolling. The process in general use for the production of these slabs is very undesirable and disagreeable for the men employed; this apparatus eliminates all the disagreeable features and also permits of making slabs of metal of either the same or different weights.

907,840. December 29, 1908. MELTING FURNACE. Gabriel A. Menendez, Chicago, Illinois, assignor to Goss Printing Press Company, Chicago, Illinois. A furnace for melting stereotype metal that is provided with an improved melting pot and methods for withdrawing the molten metal from the same more conveniently than heretofore.

908,154. December 29, 1908. REDUCTION PROCESS FOR PRODUCING METALS AND ALLOYS. Geo. O. Seward and Franz Von Kügelgen, Holcombs Rock, Virginia, assignors to Virginia Laboratory Company, New York, N. Y.

This is a process for the production of pure metals or metallic alloys direct from the ores by means of the electric furnace. The operation consists in reducing a metallic compound not in the metallic state, by means of an alloy of an alkali earth metal and another suitable metal. For instance, if the inventors wish to produce pure aluminum they may use for the reducing alloy calcium-magnesium aluminum, of which both the calcium and the magnesium are consumed in the reduction freeing the aluminum of the alloy to commingle with the reduced aluminum. They believe themselves to be the originators of the following alloys which are highly useful as reducing alloys: Barium, magnesium, strontium-magnesium, stronium-aluminum.

Associations and Societies

DIRECTORY OF AND REPORTS OF THE PROCEEDINGS OF THE METAL TRADES ORGANIZATIONS.

AMERICAN BRASS FOUNDERS' ASSOCIATION.

President Charles J. Caley, New Britain, Conn.; Treasurer, John H. Sheeler, Philadelphia, Pa.; Secretary, W. M. Corse, Detroit, Mich. All correspondence should be addressed to the Secretary, W. M. Corse, 123 Palmer Avenue, East, Detroit, Mich. The objects of the Association are for the educational welfare of the metal industry. Annual convention with the American Foundrymen's Association the latter part of May each year in a succession of cities, as invited. The 1909 Convention will be held in Cincinnati, Ohio.

Secretary Corse reports a new member—The Whitlock Coil Pipe Company, Hartford, Conn. References from the various vice-presidents indicate an early campaign for new members.

INSTITUTE OF METALS.

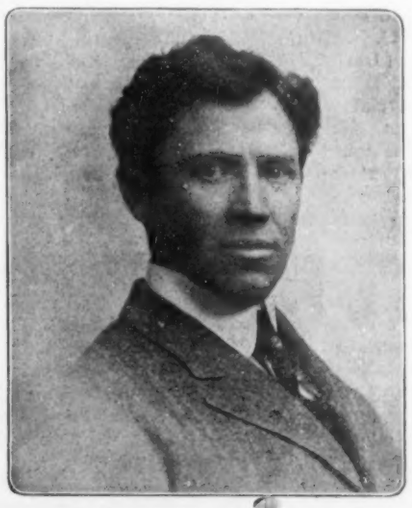
President, Sir William White; Treasurer, Professor Turner; Secretary, G. Shaw Scott. All correspondence should be addressed to the Secretary, G. Shaw Scott, M. Sc., Institute of Metals, The University, Edgbaston, Birmingham, England. The objects of the Institute are for the educational welfare of the metal industry.

THE FOUNDRY AND MANUFACTURERS' SUPPLY ASSOCIATION.

President, F. N. Perkins, Freeport, Ill.; Treasurer, J. S. McCormick, Pittsburgh, Pa.; Secretary, C. E. Hoyt, Chicago, Ill. All correspondence should be addressed to the Secretary, C. E. Hoyt, Lewis Institute, Chicago, Ill. The objects of the associations are for the commercial and technical education of the iron and metal industry. Annual Exhibition and Convention with the American Foundrymen's Association, latter part of May each year in a succession of cities, as invited. The 1909 Exhibition will be held at Cincinnati, Ohio.

C. E. Hoyt has been appointed secretary to fill the vacancy caused by the resignation of H. M. Lane. Mr. Hoyt is instructor in mechanics at the Lewis Institute, Chicago. His first position was in the shops of E. E. and W. Hoyt, where he had worked during vacations, and completed his time in the foundry. After employment in Kalamazoo, Cleveland and Milwaukee foundries from 1891 to 1894 Mr. Hoyt was junior member of the firm of W. V. and C. E. Hoyt, founders and machinists.

In the fall of 1894 he gave up commercial work to take charge of the pattern shop and foundry in the mechanical department in the Michigan State College at Lansing. In 1898 he left there to take charge of the foundry department of the Lewis Institute Engineering School, Chicago, and has had charge of this department for the past ten years.



C. E. HOYT.

Mr. Hoyt was interested in the old Western Foundrymen's Association until it was disbanded, and has been in attendance at many of the American Foundrymen's conventions since the Cincinnati meeting in 1898. He was elected secretary-treasurer of the Associated Foundry Foremen of Chicago and vicinity in 1906, which office he has held since that time and at the Toronto meeting, June, 1908, he was elected secretary-treasurer of the Associated Foundry Foremen of America.

NATIONAL ASSOCIATION OF BRASS MANUFACTURERS.

President, Joseph H. Glauber, Cleveland, Ohio; Commissioner, William M. Webster, Chicago, Ill. All correspondence should be addressed to the Commissioner, William M. Webster, 1110 Schiller Theatre Building, Chicago, Ill. The objects of the Association are to promote in all lawful ways the interests of firms engaged in the manufacture of brass goods. Meets every three months. Each meeting fixes the place and date of the meeting to follow, consequently there is no stated place. It has been customary for the Association to hold its Annual Meeting in New York City, but the last meeting was held in Philadelphia. The Semi-Annual Meeting is generally held at Atlantic City or some other Sea Coast town.

The National Association of Brass Manufacturers at their meeting held at the Bellevue-Stratford in Philadelphia on December 8-9, 1908, passed an order in effect January 1, 1909, making $1.00 per cwt. the maximum freight allowance on shipments of 125 lbs. or over, but in no case to allow freight in excess or beyond that actually paid by the consignee. The above rule applies to all parts of the United States and Canada. The association elected the following officers:

Joseph H. Glauber, Cleveland, O., president; trustees, J. W. Sharp, Jr., Philadelphia, Pa.; A. D. Sanders, Chicago, Ill.; Fred Somerville, Toronto, Canada; E. F. Niedecken, Milwaukee, Wis.; A. S. Deutsch, Cleveland, O.; A. S. Hills, Haydenville, Mass.; William M. Webster, commissioner, Chicago.

The meeting was well attended and matters were discussed relating to freight rates, tariffs, labor situations, etc.

Adjournment was then taken to meet in St. Louis, Mo., on March 16th and 17th.

AMERICAN FOUNDRYMEN'S ASSOCIATION.

President, L. L. Anthes, Toronto, Ont.; Secretary and Treasurer, Dr. Richard Moldenke, Watchung, N. Y. All correspondence should be addressed to the Secretary, Dr. Richard Moldenke, Watchung, N. J. The objects of the Association are for the educational welfare of the iron and metal industry, principally iron and steel. Annual Convention the latter part of May each year, in a succession of cities, as invited. The Convention of 1909 will be held in Cincinnati, Ohio.

THE NATIONAL FOUNDERS' ASSOCIATION.

President, Henry A. Carpenter, Providence, R. I.; Vice President, O. P. Briggs, Minneapolis, Minn.; Secretary, F. W. Hutchings, Detrot, Mich.; Treasurer, People's State Bank of Detroit, Mich. The objects of the Association are for the commercial welfare of the foundry trade. The Association has an Administrative Council, composed of sixteen members, which meets at the call of the President. The annual convention is held in November, usually in New York. Correspondence should be addressed to the Secretary, F. W. Hutchings, 915 Hammond Building, Detroit, Mich.

NATIONAL MACHINE TOOL BUILDERS' ASSOCIATION.

President, Fred L. Eberhardt, Newark, N. J.; Treasurer, W. P. Davis, Rochester, N. Y.; Secretary, P. E. Montanus, Springfield, Ohio. The objects of the association are to promote the interests of the machine tool builders in the direction of good fellowship and the liberal discussion of subjects relating to the improvement, standardization of parts and methods of manufacturing machine tools. The association meets at the call of the Executive Committee. Annual meeting held in New York City. Semi-annual meeting selected by the association. Correspondence should be addressed to the Secretary, P. E. Montanus, of Springfield, Ohio.

NEW ENGLAND MANUFACTURING JEWELERS' AND SILVERSMITHS' ASSOCIATION.

President, Harry Cutler; Treasurer, Harry M. Mays; Secretary, Everett L. Spencer, all of Providence, R. I. All correspondence should be addressed to the Secretary, Everett L. Spencer, 42 Weybosset Street, Providence, R. I. The objects of the Association are for the commercial and educational welfare of manufacturing jewelers and silversmiths.

MANUFACTURING JEWELERS' ASSOCIATION OF NEWARK, N. J.

President, George R. Howe; Treasurer, J. M. Riker; Secretary, Harry Durand, all of Newark, N. J. All correspondence should be addressed to the Secretary, Harry Durand, 49 Franklin Street, Newark, N. J. The objects of the Association are for the commercial welfare of the manufacturing jewelers of Newark. No regular meetings are held, but the Association is governed by a Board of Managers, who meet at the call of the President.

THE ASSOCIATED FOUNDRY FOREMEN.

President, W. S. McQuillan, Warren, Pa.; Secretary-Treasurer, C. E. Hoyt, Chicago, Ill. All correspondence should be addressed to the Secretary, C. E. Hoyt, Lewis Institute, Chicago, Ill. The objects of the Association are for the advancement of the interests of all foundry and pattern shop foremen and their employees. The Association has a branch in all of the manufacturing cities, and full information can be obtained by corresponding with the General Secretary, C. E. Hoyt.

ASSOCIATED FOREMEN PLATERS.

Messrs. Charles H. Proctor and C. S. Barbour, Jr., foremen platers, are advocating the organization of this association, the objects of which are for the educational welfare of platers. All correspondence should be addressed to Charles H. Proctor, 621 Chestnut Street, Arlington, N. J., or care of THE METAL INDUSTRY. The first meeting to be determined by the platers who are desirous of joining this association.

AN APPEAL FOR THE FORMATION OF A NATIONAL SOCIETY OF ELECTRO-PLATERS.

To the Editor of THE METAL INDUSTRY:

I have been deeply interested in the controversy over the cleaning of nickel anodes and have read both sides of the discussion with much intrest. I am sure this discussion proves that once in a while the plater will come out of his shell and expose himself, especially when there is danger of some of his own exclusive thoughts and pet theories becoming overthrown in the light of publicity. Such discussions as these are what we need. This is the very reason why to-day we need an association of platers, national in its scope. This is the very reason why two years ago, in an address before the newly-formed American Brass Founders' Association in Philadelphia, I mentioned the fact that a national association of platers was necessary.

I realize to-day that a mistake was made when I suggested the formtion of an auxiliary association subject to the rules and regulations of the parent body, the American Brass Founders' Association. I find that the plater has nothing in common with the brass founder any more than the brass founder had with the iron founder. But as a separate organization distinct from the Iron Founders' Association the American Brass Founders' Association is going forward rapidly. Its membership is constantly increasing and it is accomplishing results by the interchange of thoughts and ideas that have proved instructive and beneficial to its members.

Well, Mr. Plater, what are you going to do. Once in a while you will come out of your shell and show that you can fight when you want to. You have a thinking mind. Don't you think it is about time you thought of an association that would be national in its scope. Not for you alone nor I, but for the welfare of us all. As a great factor in the industrial and commercial arts are you not worthy of such an association? I am ready to do my part; are you ready to do yours?

It takes money to accomplish some things. I have a dollar or two for this cause. How much have you? Unlike the American Brass Founders' Association, we have no rich Iron Founders' Association to support us; we must stand alone. What do you say? THE METAL INDUSTRY, I have no doubt, will be pleased to receive communications upon this subject.

CHARLES H. PROCTOR.

Arlington, N. J., January 1, 1909.

ITEMS OF INTEREST TO THE INDIVIDUAL.

JESSE L. JONES.

JESSE L. JONES.

Two writers on the staff of THE METAL INDUSTRY whose papers on metallurgical and plating subjects have pleased, instructed and aided thousands of metal founders and platers are Jesse L. Jones and Chas. H. Proctor, whose portraits we are herewith pleased to print. Both of these writers, besides being able to direct others are practical men; men who can do what they write; can go into a foundry or plating shop and work out successfully the very problems they have described.

Jesse Lee Jones, the metallurgist, received his technical education at the Ohio State University, Columbus, Ohio, graduating in the class of 1890. He was first employed as assistant chemist with Dr. N. W. Lord, the State Chemist of Ohio, and afterwards in the same capacity with the Junction Iron & Steel Company, Minto Junction, Ohio, makers of pig iron and Bessemer steel. In 1892 Mr. Jones was chief chemist of the West Penn Steel Works, of Allegheny, Pa., makers of fine sheet steel for stamping, axle steel, etc. During the next ten years, 1893 to 1903 Mr. Jones was connected with the famous ship and engine building firm of William Cramp & Sons, Philadelphia, Pa. While there he organized the chemical and physical laboratory of that company and assisted in introducing into the United States the well-known Parson's manganese bronze and Parson's white brass.

In 1903 Mr. Jones became metallurgist for the Westinghouse Electric and Manufacturing Company, Pittsburg, Pa., taking charge of the chemical and physical laboratories. His, work, both at Cramps and Westinghouse plants has attracted wide attention in metallurgical circles and he is noted as being one of the best metallurgists in the country on the subject of electrical alloys, manganese bronze and other special mixtures.

CHARLES H. PROCTOR.

If ever there was a self-made writer it is Chas. H. Proctor. For lacking the advantages of a college education he has studied and written for years, since he first entered industrial works, which he did at the early age of sixteen. Mr. Proctor was born in Birmingham, England, in 1866. His first knowledge of chemistry was learned at the age of fifteen under Professor Baker of the Midland Institute of that city. Upon leaving school he first went to Belgium and in 1881 to the United States, first going West, thence to New England, where in 1882 he entered the employ of an uncle, William Skidmore, of Birmingham, Conn. (now Derby), a manufacturer of wire goods. There he took a course of study in the electro-deposition of metals. In 1884 he entered the employ of the Osborne & Cheesman Company, of Shelton, Conn., where he was first in the rolling department, then in the wire and tube drawing, finally in the finishing. In 1886 Mr. Proctor visited England and looked over many of the large metal plants. Returning to America in 1887 he took up newspaper reporting for the Daily Advertiser of Shelton, Conn., until the paper stopped publication in 1888. In 1889 he entered the employ of the Ansonia Brass and Copper Company, Ansonia, Conn., to get a practical experience in the electro-deposition of metals, and was under the direction of Edward Bernard, who was then in charge of the various departments of plating, finishing and lacquering, and whom Mr. Proctor regards as one of the best-known and widely experienced platers in the United States. Mr. Bernard is now connected with the Russell & Erwin Manufacturing Company, of New Britain, Conn. From Ansonia Mr. Proctor went with the F. H. Lovell Company, of Arlington, N. J., manufacturers of naval and railroad supplies, and is in charge of the various departments connected with plating and finishing, including the casting of white metals. Since 1904 he has been a staff writer of THE METAL INDUSTRY. Mr. Proctor has taken a considerable interest in societies, having been a member of the Pilgrim Lodge I. O. O. F. of Arlington, N. J., a member of the Kearny Lodge No. 1050 of the Elks of Arlington, King Hiram Lodge No. 12 F. A. M., Derby, Conn., and the Friendship Lodge A. O. U. W., of Ansonia, Conn. He is now interested in forming the proposed National Society of Platers.

CHARLES H. PROCTOR.

A. L. Haasis, crucible salesman and art collector, has issued his usual unique New Year's greetings. The 1909 edition is signed "Taftily Yours."

Thomas Kiley, formerly in charge of the brass department of the Nelson Valve Company, Philadelphia, Pa., has resigned that position to go with the Jenkins Brothers Company, Montreal, Canada.

Nathan Emery, foreman of the grinding and smelting department of the Lalance & Grosjean Company, Woodhaven, N. Y., has resigned and he will take a position with the Victor Typewriter Company, New York, where he was formerly employed.

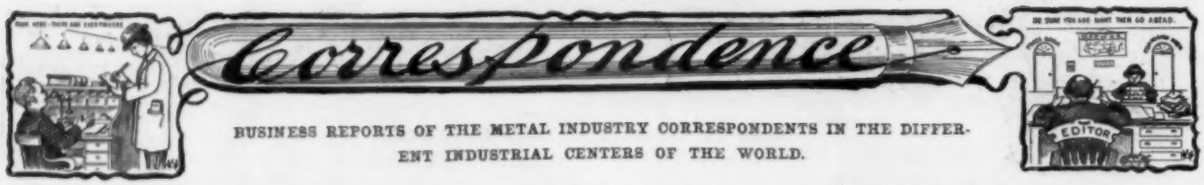
Joseph T. Boland, metallurgist of the United Wire and Supply Company, Providence, R. I., has resigned his position to establish a plant of his own for the manufacture of small sized tubing and rolled gold plate. No one has taken the place of Mr. Boland at the United Wire and Supply Company.

Press dispatches in the newspapers from Augusta, Ga., announce that President-Elect Taft has selected Charles F. Brooker to become Chairman of the Republican National Committee. Every one in the brass business knows that Mr. Brooker is President of the American Brass Company, the largest brass manufacturing concern in the world.

Arthur L. Stevens, an industrial and furnace engineer, has entered the services of the Rockwell Furnace Company, 26 Cortland street, New York, and will be actively engaged in the company's interests. Mr. Stevens has given much attention to the metallurgical field, especially in connection with oil and gas furnaces, and his aim will be to follow up their work in the line of economical, accurate and controllable temperature furnaces for industrial purposes, which the Rockwell Furnace Company are putting on the market.

DEATHS.

Joseph Wharton, the founder of the Nickel Smelting Industry in the United States, died at his home in the suburbs of Philadelphia on January 11, age 83 years. Besides being a business man of considerable prominence, Mr. Wharton was also prominently identified with a number of educational institutions.



BUSINESS REPORTS OF THE METAL INDUSTRY CORRESPONDENTS IN THE DIFFERENT INDUSTRIAL CENTERS OF THE WORLD.

WATERBURY, CONN.

JANUARY 11, 1909.

Throughout the entire Naugatuck Valley the year has started with a feeling of confidence and plenty of work. Here in Waterbury the brass factories especially are busier than they have been for several months and on account of the rush of orders nearly all departments were kept going throughout the holidays with the exception of Christmas Day and New Year's Day. So pressed is the Chase Rolling Mill Company that when a slight accident to its flywheel in the main engine room during the past week necessitated a shut-down of a day in some departments, nearly the entire force of day and night gangs of rollers and casters was requested to work on a stretch of twenty-two hours Saturday and Saturday night to get caught up.

In a recent interview John P. Elton, one of the brass authorities of this section and treasurer of the American Brass Company, declared that there was no great boom in sight, nor yet any reason for fear of dull times, but withal the different departments of the brass company's factories in this city are working with day and night gangs and with nearly the fullest compliment of help.

In the watch industry alone does there seem to be little bustle, and this condition has been marked since last Thanksgiving. All the brass pin shops, novelty shops, cutlery plants and the silverware factories are kept busy with about the average number of hands and in the smaller shops satisfactory conditions are found.

On account of inventory details being incomplete most of the local manufacturers decline to discuss the year's business for publication, but the year just closed has been, on the whole, a satisfactory one. During the hardest times last winter nearly all the larger shops found currency and specie enough to pay off regularly, only a few concerns resorting to the check system for lack of cash, and since the end of the sunmmer the revival has been steady and healthy. At the present time the number of employees is about equivalent to the average for the prosperous times preceding the summer of 1907.

One of the helpful factors in the work of the Scovill Manufacturing Company and some of the others which turn out fine metal products is the award of a large contract by one of the leading safety razor companies. During the fall the machines were perfected in the Scovill shop and whereas only one or two parts were manufactured here in the past, the entire razor is now to be turned out in Waterbury shops.

There is no disposition on the part of any of the local corporations to minimize the importance of the tariff and close watch is being kept on the testimony of those supposed to be near the tariff reformers in Washington. On account of the keen competition of German factories with the products of this section in recent years a cut which would favor German hardware would cause considerable unrest and it is not unlikely that a few of the local products would be seriously affected.

With the automobile business running along well in all parts of the world and no apparent decrease in the amount of repairing necessary, the smaller shops here which have been rapidly developing the manufacture of automobile novelties and parts of brass and bronze have been enabled to run along unusually briskly.

Overtime is necessary to keep up with orders now in all the pin shops, several of the novelty manufacturing plants and tubing mills, although the brass business is enjoying the only real rush. In the Scoville Manufacturing Company, The Chase Rolling Mill Company and the Benedict and Burnham Manufacturing Company (American Brass Company) plants night and day gangs are at work.

Within a few days definite information as to the possibility of rebuilding the destroyed cities in Italy and Sicily is expected, and at that time, it is expected here, there will be a general bustle among brass factories for stock to meet the demands sure to follow reconstruction. Locally there is a building boom of some proportions and as Connecticut at large seems on the verge of a building revival equal to that which established new records in 1906 and 1907, such of the building materials as are turned out here are being provided so as to meet rush orders later in the year.

Salesmen on the road (few of the factories have the full corps traveling) report encouraging prospects and collections are satisfactory. F. F. B.

PROVIDENCE, R. I.

JANUARY 8, 1909.

The manufacturing jewelers of Providence and vicinity report a Christmas trade of unexpectedly large proportions. The fall trade opened late and the jewelers were fearful for a time that the hard times of the summer were to be continued through the winter. The volume of business increased with a bound, however, as the return wave of prosperity made itself felt, and by the time the heavy demands for the Christmas trade set in everyone had plenty of orders. Most of the manufacturers have orders enough on hand at the present time to assure them of a busy season for several months. One of the surest indications of the rapid resumption of business by the jewelers is the demand for skilled help.

Thirty guests were present at a recent banquet given to the employees of the bronze department of the Gorham Manufacturing Company, by Gutzon Borglum, for whom the company recently cast in bronze a colossal statue of Gen. Philip Sheridan. The statue was designed for the United States Government and has recently been set up in Washington. The casting of the horse marked an important event in bronze casting, for instead of being cast in sections as is usually done, it was cast in one piece and was the largest bronze piece cast in the history of the world. The first attempt was a failure, but the second was entirely successful, and the operation was watched by a group of prominent jewelry manufacturers.

The locket department of H. A. Kirby's factory has been working 13 hours a day for a number of weeks in an effort to keep up with the rush of orders.

The formal gift to the State of Rhode Island of a handsome bronze tablet in commemoration of General John Sullivan, commander of the Continental troups at the battle of Rhode Island, took place recently. The tablet occupies a place of honor in the main entrance to the State House. It was given to the State by the American-Irish Historical Association, the funds having been secured by subscription. The tablet was designed and executed by the W. J. Feely Company of this city.—E. S. U.

ROME, N. Y.

JANUARY 11, 1909.

Tomorrow there will be filed with the Secretary of State articles of incorporation of the Spargo Wire Cloth Company. The capital stock will be $50,000. The company has been organized for the manufacture of bronze or copper wire, mosquito netting and also other kinds of wire cloth. The stockholders are the same as those of the James A. Spargo Wire Company and the following directors have been chosen: James A. Spargo, Hon. John D. McMahon, John T. Wiggins, John Baynes, William J. Doyle, Hon. John E. Mason and Fred M. Shelley. The directors have not as yet selected officers. The cloth or screen now is being woven in the plant of the James A. Spargo Wire Company, where at present 100 men are employed in drawing wire. Next spring, however, it is the intention to erect a building of steel and concrete, 200x100 feet, west of the present Spargo Wire Works. Ten experienced wire weavers now are engaged in weaving the cloth, but with the erection of the new building 20 additional skilled weavers will be put on.

The United States Government yearly buys several million feet of brass wire cloth for the purpose of protecting from mosquitoes the men who are employed on the Panama Canal. There

is also a large consumption on the seacoast. The newly organized company already has a large number of orders. Mr. Spargo, the industrial head of this enterprise as well as of the Spargo Wire Company, has made a marked success of his business, and often is the recipient of hearty congratulations.

An industry that is rapidly forging to the front, and which already has taken its place among the foremost of this city, is the Rome-Turney Radiator Company. This concern manufactures Rome special tubing for use in constructing radiators and condensers for automobiles. Their new building connects with the old one and extends along the bank of the Erie Canal, a distance of 200 feet. It is 51 feet wide and two stories high. It is constructed of concrete blocks. The first floor is of concrete, the second of pine and has a slag roof. The work of installing machinery in the new building is about completed. On the first floor of the building will be the spiral tube winding department. On the second floor tinsmiths will work on sample radiators and there also will be made the radiators for electric railway purposes. For the present the old building will be used to fill the contracts on hand for automobile radiators. The company now is working on contracts for the General Electric Company, of Schenectady and West Lynn, Mass. It has orders for the delivery of nearly 20,000 radiators during the next season. At present there are 115 men employed, but it is expected that during the busy season next summer work will be given to 275 or 300 men.

A recent press dispatch reports that the Central Bedding Company, of Illinois, a branch of the Rome Metallic Bedstead Company, of Rome, N. Y., has leased from John A. Spoor and Frederick S. Winston, trustees, a tract of 40,950 square feet on Center avenue, in Chicago, junction Belt Railway, for twenty-five years, at an annual rental of $6,000. The trustees are to erect on the property a one-story and basement building, 112x273 feet ground dimensions, to contain 61,152 square feet of floor space and to cost about $60,000.—A. R.

CLEVELAND, OHIO.

JANUARY 3, 1909.

Cleveland is to hold an industrial exposition in June next and the various metal industries in this city are preparing to make extensive displays. The exposition will last two weeks and will be open to manufacturers of Cuyahoga County, of which Cleveland is the county seat. There are 3,800 manufacturers in this territory, making over 100,000 articles, many of which are of metal. It is believed that the show will present one of the most complete displays of this sort ever attempted. The exposition is promoted under the auspices of the Chamber of Commerce, an organization consisting of 2,000 of the city's leading manufacturers, professional and business men. It will be held in the Central armory, and a large temporary building to be erected on an adjoining corner.

Many thousands are being spent here in metal roofing and ornamental iron work in connection with the erection of the new county courthouse, which is costing about $4,000,000 to complete. The contract for the ornamental iron work, which is a large one, has been given to the W. S. Tyler Company, of Cleveland, one of the largest firms handling this work in the world. The Kash Roofing Company, of Cleveland and Akron, is furnishing the metal roofing. Andrew Dall & Son are the general contractors for the structure. Considerable bronze is to be used, but has not been contracted for. The building commission in charge of the erection of the building will ask for designs for lighting fixtures within a few weeks.

Two great bronze stags, with wide spreading antlers, will guard the entrance to the new city zoo in Brookeside park when the present plans of the city park department are carried out. A large concrete bridge over Big Creek will have large flat pedestals on which the bronze figures will go. The work is being planned by Park Engineer Stinchcomb.

The Globe Brass Manufacturing Company, which has a plant on Prospect avenue, West Cleveland, and which manufactures a high grade line of brass plumbers' supplies, reports business as good, with the outlook excellent. The manager says that extensions are planned this year, so rapidly is the business growing.

SAN FRANCISCO, CAL.

JANUARY 1, 1909.

The metal trades of San Francisco are fighting for home manufacturing. Brass foundries, gas and electric fixture factories and plating job shops are co-operating for the benefit of the people engaged in the various industries on the Pacific Slope. All of the shops are fairly busy and a number of them have taken advantage of the dull season and are improving and developing their facilities to meet Eastern competition.—L. G.

THE BRITISH BRASS, SILVER AND JEWELRY TRADE FOR 1908—OUTLOOK FOR 1909.

INTERESTING REVIEW BY J. HORTON, BRITISH CORRESPONDENT OF THE METAL INDUSTRY.

J. HORTON.

The year just closed has left a record behind it which everyone in the British brass, metal and jewelry trades sincerely hopes will not be equaled for a good many years to come. The British manufacturer, as far as the brass trade is concerned, describes it in emphatic superlatives. "Worse than I ever recollect" was the summary of one large manufacturer. This concern has dismissed a large number of workpeople, and is only holding its own by the cheapening of labor and the introduction of machinery. That is quite a typical experience. It is generally agreed that foreign competition has had very little to do with this, and, in fact, that the Birmingham manufacturer has had a full share of the world's trade. It is a case of meagre demand; and for the little work available there is a fierce and desperate competition which occasionally flings considerations of profit to the wind. As the year closes there are signs of slight improvement, and on all hands it is agreed that next year will see a change for the better. The chandelier and electric light trades have shown signs of returning animation. But it happens to be in this branch in particular that the foreigner, frozen out elsewhere, has secured a look-in, apparently owing to the extreme lightness of his wares described in one quarter as "of featherweight." The "out-of-works" are fewer than they were three months ago, and some of the firms during December were working overtime. The wretched demand for shipbuilding fittings has greatly contributed to the depression.

The fall in the price of copper which is still in progress has disorganized matters by encouraging the postponement of orders, though to some extent it has been beneficial to the manufacturers in reducing the cost of production. Prices have not varied greatly during the year, no single formal declaration of change, snch as took place a couple of years ago, having been made, although there has been cutting of prices in all directions in the individual scramble for orders.

The interesting features of the year have related to labor. The relations between employers and workpeople have been less friendly than for some years past, outbreaks of irritation and bitterness having repeatedly been manifest. It was unfortunate for the workpeople that a demand for an advance in wages was rendered practically hopeless by trade depression. In this industry actual figures are available as to unemployment. The returns are not quite so bad as in 1897 or 1904; but according to the Secretary of the National Society of Amalgamated Brassworkers there were in the autumn, of the 5,000 men engaged

in the Birmingham trade, 3½ per cent. out of work, excluding those in receipt of sick pay. This, of course, takes no account of those working short time. It is frankly admitted that women's labor, especially on capstan lathes, and the constant increase of machinery, is largely responsible for the increased unemployment. It is particularly complained that a large number of married women are working in the shops, and that this is increasing. The society have had a new and unpleasant experience in having to put on a levy to maintain their out-of-works.

In the brass trade the year will be historic owing to the determination to terminate the arbitration arrangement with its conciliation board, an organization which has existed for something like fifteen years. At a meeting of the men held in March last a resolution was adopted authorizing the requisite notice to terminate the arrangement between the men's society, the employers' association, and the Board of Trade, "it having proved to be an illusion and a middle-class snare." This action was based upon the disgust of the men on account of the refusal of Sir James T. Woodhouse, the Board of Trade arbitrator, to concede the men an advance in wages. The men asked for the establishment of a minimum wage for day workers and 10 per cent. increase for piece workers. The latter section of the demand was bitterly opposed, many employers asserting that their pieceworkers are handsomely paid. Others declared their readiness to concede the minimum wage, and so level up the worst paid workers. One or two have done so voluntarily. The most significant resolution at the men's meeting was the following: "That owing to arbitrators being without exception selected from the capitalist class, and the awards always, so far as the brass trades are concerned, in favor of employers, this meeting resolves to resort to the old methods of improving the conditions of labor." This, of course, indicates a determination to resort to the old methods of strikes and lockouts as a means of settling wages when the parties fail to come to an agreement otherwise. It can not be said that the employers are greatly concerned over the collapse of the Conciliation Board. While it was a useful buffer between two rival interests, it is argued that an institution which so easily collapsed could be of no great value.

In the conditions of working most important progress has been made during the year. The prolonged agitation initiated by the men's society, and, either tacitly or openly, supported by the employers, for some better means of ventilating and removal of the injurious fumes of the casting shop led to the introduction of Home Office regulations. A large proportion of the manufacturers resisted these, and as a result there was a Home Office inquiry and they were modified. One very important concession was the permission to introduce improved ventilation by means of fans, instead of by the special apparatus for carrying off fumes direct from the casting pots, but the great point is that the new arrangements are postponed until January, 1910, and the changes have therefore not yet been undertaken on any large scale. It is agreed that they will be highly beneficial when they are in full force. Many manufacturers plead the absence at present of any suitable apparatus for strip-casting, owing to the development of gases in the pots, which are apt to become explosive with any kind of covering or enclosure.

An important development is the establishment in connection with the Birmingham Chamber of Commerce, of the Brass, Copper and Allied Trades Section, the particular duty of which will be to deal with matters in the non-ferrous trades. The Section are busily engaged at present in negotiations with the Home Office with regard to various factory regulations dealing with brass castings, the tinning of hollowware and other matters.

The metal rolling mills, except those devoted to silver, have generally had a dull time during the year, largely on account of the depression in the cycle and motor trades and the poor demand for cartridges, which in normal times consume an enormous quantity of the metals which have so long been among the more important of Birmingham specialties.

Although the jewelry and silver trades have been on the whole unsatisfactory, it would be the greatest mistake to apply to them any such sweeping generalization as is generally, and on the whole truthfully, applied to the brass trade. There is no trade society giving out-of-work statistics, except a small organization of silversmiths with a membership of 400. In the jewelry and allied trades it is estimated there are between 50,000 and 60,000 people engaged, of whom a calculation, professedly well informed, estimates 5 per cent. to be out of work. The number is probably exaggerated. While there has been a good deal of short time, the out-of-works are comparatively few. The Assay Master's returns also, already published in METAL INDUSTRY, point to anything but trade stagnation. For the present purpose they may be reproduced:

	1906.	1907.	1908.
Gold wares assayed and marked —ounces	349,308	371,036	381,957
Silver wares assayed and marked—ounces	3,838,482	3,720,804	3,588,640
No. of gold and silver wares entered for assaying.....	12,894,931	12,693,721	13,355,074
No. of assays made.....	423,975	460,316	478,330

It is inevitable that with prevalent bad trade in other industries, all trades which minister to luxury have suffered. But there have been most important counteracting movements. While the Christmas trade generally, to which the manufacturers looked forward, has been disappointing, many factories are working overtime. The makers of really first-class jewelry seem to command a fairly stable market, while in regard to foreign competition great inroads have been made into those markets formerly captured by the foreigner, and particularly in the recapture of the home markets. A great many German travelers in search of British orders have lately gone away empty. For some reason, Germans have found it necessary, within the past few months, to increase the price of their goods, especially chains, whereas the British article has kept its old price. A certain proportion of paste goods not cultivated by the British maker are still sent in large quantities, though in nothing like the former volume. For gold rings, brooches, chains, and high-class jewelry, Birmingham still has an enormous market.

Great progress has been made also on the artistic side, largely through the instrumentality of the art schools, and the British maker is now well abreast of his Continental competitor. A most important development during the year has been the commencement of day classes at the Victoria Street School to which manufacturers have sent their youthful employees for part of the day without any deduction from their wages. The seaside trade has been very unsatisfactory; but this is attributed partly to the rival attractions of the Franco-British Exhibition which took many thousands to the metropolis, without any corresponding addition to the sale of jewelry. There has no doubt been a good deal of manufacture for stock, which may partly account for the unexpected values shown in the assay returns. Unfortunately, the trouble of foreign tariffs is always with us, one of the unpleasant experiences of the year being the loss of a portion of the Australian trade through increased tariff restrictions.

The department most successful of all in resisting the general depression has been that devoted to silver manufacture. This is a trade which really is going forward by leaps and bounds, and it would seem that the rate of progress is accelerating. It is significant that Messrs. Elkington & Co. have had a record year. Other manufacturers devoting themselves to large and handsome forms of silverwear have done almost equally well. One concern, by no means in the front rank as regards productive capacity, has sold an enormous number of flower vases worth £18 to £19 apiece. The sale of small silver goods is astonishing. For example, a small silver salt-cellar was pointed out to the writer, of which 250 gross has been sold. Another maker has recently booked an order for 32 gross of flat cedar hall-marked pencils. One of the busiest of the firms has not sent out a single sample since September, yet has months' work on their order books. It is manifest that what was described in these columns some time ago as the silver revolution is still in progress. The ingenuity of makers is continually applying cheap silver to new and dainty domestic toilet uses. The windows of the best shops are full of such articles as ladies' bags, butter and cheese forks, silver nut cracks, toast racks, waiters of all descriptions and all sorts of toilet ware. The more stringent regulations excluding shadow jewelry from all marking privileges has also had the effect of raising the quality.

Yet side by side with this there is an increasing trade for electro-plate due partly to better quality, but also to cheaper methods of production and especially cheaper labor. The best goods can now be had at a selling price barely half what they used to cost. To the prospects of this trade in the future there would appear to be hardly any limit. Inquiries are increasing, and the general belief is that a considerable increase of business will take place next year as a result of the general revival anticipated for British industries.

TRADE NEWS

TRADE NEWS OF INTEREST DESIRED FROM ALL OF OUR READERS. ADDRESS THE METAL INDUSTRY, 61 BEEKMAN STREET, NEW YORK.

The Georgia Manufacturing Company is a new concern at Binghamton, N. Y., to manufacture brass steam goods.

M. Blasberg & Company, of Turner's Falls, Mass., have doubled the size of their brass foundry building and have added three new furnaces.

The Pittsburg-Hickson Manufacturing Company, Butler, Pa., have put in a department to manufacture bedsteads of all brass; they have heretofore been making iron beds only.

The Stuttle Brass Manufacturing Company, Batavia, Ill., doing at the present time a general jobbing business in brass, bronze and aluminum, expect shortly to enter the brass and bronze novelty field.

Bay State Brass Company, Haydenville, Mass., are making plans to double their foundry capacity. New machinery has been ordered for their main shop and they are equipping the top floor with electric motors.

W. S. Tyler Company, manufacturers of brass and copper wire specialties and brass and copper and bronze architectural works, Cleveland, O., are putting up another addition to their immense factory on St. Clair street.

The Globe Plating Company, Mansfield, Ohio, have moved from their former location, Temple Court, to No. 180 East Orange street, where they are now ready to do general jobbing plating work in gold, silver, copper, nickel and brass.

The Bridgeport Crucible Company, Bridgeport, Conn., is now represented in New York City by C. H. Spotts and W. F. Swearer, 30 Church street, both of whom were formerly connected with the Joseph Dixon Crucible Company.

The Art Metal Company, of Salt Lake City, Utah, has opened a store at 427 South Main street for the manufacture of artistic effects in chandeliers. The store is unique in that it caters especially to artistic wares rather than purely commercial.

The Great Western Smelting and Refining Company, Chicago, Ill., have bought the good will and plant of the Acme Metal Company of that city. They will make very extensive improvements and use the plant as a headquarters for the Southwest territory.

The Merit Metal Company, 397 Straight street, Paterson, N. J., manufacturers of all kinds of bronze, aluminum and composition castings are putting on the market a new bearing metal known as "Merit Metal." The Merit Company also manufacture babbitt metals for all purposes.

The Duluth, Minn., Central High School has established a molding department in the manual training course. For this year the molds will be poured in lead melted in a blacksmith forge. Next year they may instal a gas furnace to melt the more refractory metals.

S. H. Caufman and John Baldt, proprietors, of the Penn Pattern Works, Chester, Pa., have opened a brass foundry in connection with their pattern shop and have changed the firm name to The Penn Manufacturing Company. They make castings of brass copper and all alloys.

American Counsul John F. Jewell, reports that a large piano company of Melbourne, Australia, are now erecting a large factory in that city. They propose later on to add iron and brass foundries in order to make complete all parts of the piano frames, candelabras, castors, hinges, etc.

The Art Metal Novelty Company, of Hartford, is now removing its works to Building No. 11 of The Meriden Fire Arms plant, Meriden, Conn., where they will conduct a modern, up-to-date plant, which they now expect to have in operation by February 1. The offices will remain in Hartford, Conn.

The Waukegan Brass Manufacturing Company, Waukegan, Ill., is a new concern started by Charles F. Kressin, formerly vice-president of the Northern Brass Works, at Waukegan, and Otto E. Casperson, also formerly with the same company. They will manufacture high class ground key and plumbers' brass goods.

Metallic Casket Company, of Springfield, Ill., have erected a new six-story building of modern fireproof construction. They will use this for their entire plating department in the basement and three lower floors and using the upper stories for storage for the present or until they gradually grow into the entire building.

The Manitowoc Aluminum Foundry Company, Manitowoc, Wis., is erecting an addition to its plant 100x200 feet, two stories high, which will be used as an addition to the molding and coil rooms. This concern also purchased a lot 80x165 feet south of its present plant, upon which another building will be erected early in the spring.

The Aluminum Company of America hope by the middle of January to get their new rolling mill at Niagara in operation. The New Kensington mill of the company is running quite full at the present time and wishing to keep all of their customers satisfied and fill orders promptly, the company intend to start the new Niagara rolling mill.

The Manufacturers' Equipment Company, Chicago, Ill., calls attention in this issue to the Aerochuck, an air-operated chuck for brass manufacturers' use, which they claim has been demonstrated to effect great economy in the production of brass goods. Their air-operated countershafts also possess many advantages over the old-style countershaft.

The Scovil Manufacturing Company, Waterbury, Conn., the largest independent brass concern in the Naugatuck Valley, has bought the entire Imri Spencer property on East Main street adjoining its plant. The deal gives the Scovil Company possession of nearly all the land on the south side of East Main street, between Mill street and Hamilton avenue.

Referring to the plumbago market situation the McCullough-Dalzell Crucible Company, of Pittsburg, Pa., who import this product direct, say: "Plumbago being a world commodity, it is hard to predict what the future will bring forth. There has been an average advance of 24 per cent. in prices since September 30, 1908. The market is likely to remain steady for some time.

About the first of February the firm of William Cramp & Sons Ship & Engine Building Company, Philadelphia, Pa., will have their next sale of turnings, scraps and ingots. These sales take place at irregular intervals when the company disposes of a large variety of materials. The specifications may be obtained by writing to the William Cramp & Sons Ship & Engine Building Company.

The International Chemical Company, of Camden, N. J., are manufacturing a special material under the name of High Test Real Potash No. 3, particularly adapted to the cleaning of iron and steel preparatory to nickel-plating, etc. They also manufacture a large number of special grades of potash adapted to the removal of japan, lacquers, mineral oils, paints, grease, etc., from all kinds of metals.

The large new works of The National Sanitary Manufacturing Company, manufacturers of bathroom appliances, located at Salem, O., are equipped throughout with the "Kirkwood" system of fuel oil burning as manufactured by The Tate, Jones & Co., of Pittsburg, Pa. Due to the peculiar topographical conditions, it is necessary to lift the oil to quite an elevation in order to reach the furnaces where it is used, yet so perfect is the system that but one side of their ordinary pumping system is required.

The Allyn Brass Foundry Company, Detroit, Mich., which started a little less than four years ago, has bought the factory property recently vacated by the Ford Motor Car Company. With these additions the Allyn Company bids fair to be one of the largest jobbing brass foundries of the country. The concern has two large plants at Cleveland and Buffalo. Charles B. Bohn is the manager of the Detroit works and it is due largely to his energetic efforts that the concern is so successful.

The American Sheet and Tin Plate Company, Frick Building, Pittsburg, Pa., are now rolling Monel metal, the natural alloy of copper and nickel which has been described a number of times in the columns of THE METAL INDUSTRY. The American Sheet and Tin Plate Company has the exclusive right to roll this metal and are glad to furnish full information upon application. Sheet metal goods manufacturers who have used Monel metal report that they are well pleased with its qualities as a workable metal.

Wilfong Brothers, Philadelphia, Pa., announce that they are the most extensive manufacturers of galvanizing equipment in the world and their experience covers a period of thirty years. They have been connected with all the large installations in the United States and they are in a position to fill all requirements for this kind of equipment. The proprietor of the firm, M. F. Wilfong, is a galvanizing engineer and thoroughly understands the equipment necessary for the hot process of galvanizing.

The O. J. Monsette Company, Brooklyn, N. Y., has recently made several improvements in the Monarch crusher and pulverizer which increases its capacity and makes it more durable. These machines are now made in such a manner that the heavy cone-shaped rollers can be removed from the drum without taking the drum apart. Most of the Monarch crushers are now fitted with steel linings, experience having proved the superiority of this type for use in crushing cinders, ores, etc.

The Peck Drop Press Works, New Haven, Conn., has received orders recently for two drop presses for stamping handles and bowling spoons from a firm in Austria and they have also shipped one of their 600 pound automatic drop lifters to Switzerland to be used in place of an old fashioned hand lifting device. Their loose leaf catalogue "T. M. I." tells thoroughly the merits of the automatic drop lifter which is used so extensively in up-to-date metal working establishments of the United States, Canada, and a number of foreign countries. This catalogue is sent for the asking.

Leiman Brothers, 62 John street, New York, announce that they have recently furnished a large number of machine shops with small rotary pressure blowers for use in clearing away the metal chips that accumulate around drilling and other machines. Clearing away these chips by hand consumes considerable time, but by directing a part or all of the jet of air from the blower directly on to the work the chips are blown away and the operator can give all his attention to the work. These blowers can also be used for producing a suction which can be used in connection with a vacuum cleaner for dusting, etc., around the workrooms.

A press dispatch from Monitowoc, Wis., states that an effort is under way to form a combination of the various cutting-up aluminum shops of the country and have them controlled by the Aluminum Company of America. The plants mentioned that may be absorbed by the Aluminum company in forming the combination are the Manitowoc Aluminum Novelty Works, Manitowoc, Wis.; Aluminum Manufacturing Company, Two Rivers, Wis.; The Illinois Pure Aluminum Company, Lemont, Ill., and The New Jersey Aluminum Company, Newark, N. J. No confirmation of this report was obtainable up to the time that our January number went to press. The Aluminum Company of America say that nothing of this sort has come to their attention.

The Bennett & O'Connell Company, dealers in platers and polishers' supplies, Chicago, are having the building at 94 and 96 Clinton street overhauled and as soon as this is finished they will move into this new home. The building is a fireproof structure, of four floors and basement, each 50x80 feet, giving them 20,000 square feet of floor space. The front will be lighted by four large ten-foot plate glasses. This building will give them ample room for their fast growing business and the manufacture of compositions and wheels. This firm covers a territory to the Pacific Coast, and with some business as far east as the Atlantic Coast.

The Rockwell Furnace Company has been awarded the contract covering the complete furnace equipment for the new locomotive shops of the Delaware, Lackawanna & Western Railroad at Scranton, Pa. The furnace equipment consists of thirty-five of the latest type furnaces, operated with 300 B. T. U. water gas, which is made in Loomis-Pettibone Producers. These shops will be capable of turning out complete locomotives, and are to be in operation in three months. No pains or expense has been spared to make them up-to-date, as they embody the latest and most improved machinery and equipment, selected after thoroughly inspecting a large number of modern railway and industrial plants throughout the country.

James Allen, a well-known brass founder of 2552 J street, San Diego, Cal., has been prospecting along the water front for several weeks to see if he could not find molding sand. He reports that his efforts have been rewarded by finding a splendid bank of molding sand of superior quality. The sand is free from mica, rocks and pebbles and is suitable for brass and iron work and even statuary. A test of the material was made by using it for casting a bronze lion. It is claimed that the results showed the California sand to be equal to the French for statuary molding. Mr. Allen reports that there are hundreds of thousands of tons in his bank and he will be pleased to correspond with any foundry that wishes to investigate. Fifty carloads have already been shipped and have given satisfaction.

Benjamin Middleditch, Detroit, Mich., long established and well known as a manufacturer of brass founders' and finishers' machinery and equipment, is calling attention in this issue to his sprue cutters, tilting tumbling barrels, polishing machines, brass molders' flasks, etc. Both power and foot sprue cutters are furnished. The tilting tumbling barrel is especially designed for brass and bronze castings. The barrel is 30 ins. in diameter and 26 ins. deep, made of hard maple and lined with cast iron 3/8 in. thick. The bevel flasks are made in a large number of different sizes, and standard sizes are shipped from stock. Catalogues giving further particulars are sent on request. Mr. Middleditch announces that he is building a new three-story brick addition to his factory which will give him 5,000 square feet of new floor space.

REMOVALS

Wambold-Brunschmeiler Company, brass founders, formerly located at 270 Fourth street, Milwaukee, Wis., have moved to 3009 Lisbon avenue.

The Acme Metal Manufacturing Company, formerly located at 47 South Canal street, Chicago, Ill., have moved to 74 West Monroe street.

Paul Colidge, a brass and copper worker, formerly located at 158 West Twenty-seventh street, New York, has removed to 709 East Twelfth street.

The Providence Aluminum Company, 460 Eddy street, Providence, R. I., have changed the name of their firm to the Providence Brass and Aluminum Company.

Pizer, Miller & Edelstein, silversmiths, etchers and engravers, formerly located at 180 Centre street, New York City, have moved to 109 South Fifth street, Brooklyn. N. Y.

The C. H. Lewis Pattern Works, formerly located at 120 South State street, Syracuse, N. Y., have moved to 329

Temple street, the same city, and will be known in the future as the Hoffman Manufacturing Company.

J. A. Rogers, secretary and treasurer of the Metallic Alloys Company, announces the removal of the company's New York offices from 30 Church street to 50 Church street, where they will have much larger and more convenient quarters.

FIRES

The Globe Nickelplating Company, Boston, Mass., had a slight fire December 20. The blaze was presumably caused by sparks from a buff wheel. The loss was about $100.

Sparks from a locomotive are believed to have caused a fire which broke out December 17 on the roof of R. O. Dean & Company's brass foundry, Frankford, Pa. The damage was slight.

Unique Metal Company, Buffalo, N. Y., had a fire which was started on December 8 by a leak in a pot of molten metal. The loss was $700. This was followed a week later by a second fire that did $200 damage.

A fire started in the plant of The Metal Specialty Company, Brooklyn, N. Y., on the sixth floor of the brick building at 199 Patchen avenue on the night of Dec. 12. Good work on the part of the firemen saved the entire building and total damage was about $8,000, while the loss to the metal company was only about $1,000.

FINANCIAL

The Aluminum Corporation of Great Britain, which owns reduction works in North Wales, have gone into the hands of a receiver, and an official statement published by their Board of Directors states that the failure is due to the present market price of aluminum which was too low for them.

The Frankfurter Zeitung, in commenting on the failure and the European aluminum situation, says:

"On the unfavorable business situation of the aluminum production a significant light is thrown by the intention of the company to use a part of the electric energy from their new plants, which is at their disposal, not for the manufacture of aluminum, but for the production of nitric acid and saltpetre obtained from the nitrogen of the atmosphere. For this purpose the above company, as the N. Zur. Ztg. advises, has made an agreement with the owners of the new patents of Engineer Moscicki, Freiburg (Switzerland), whose tests after experiments for several years have come to a very satisfactory close, according to which agreement the patents of Switzerland and Austria go into the possession of the Neuhausen Company. Relative to the profit obtained by the method in other civilized countries, be it by domestic manufacture or by disposing of licenses or sale of patents, the Aluminum Company has entered into a community of interest with the Freiburg Company. The Aluminum Company has already begun with the erection of a very large plant at Chippis (Wallis) for the production of nitric acid and nitrates, parts of which are expected to be in operation by next year."

INCORPORATIONS

Western Metal Company, Denver, Col.; capital, $1,000,000. Incorporators, W. D. Hoover, W. H. Chittenden, A. G. Brownlee, all of Denver.

The Charles A. Bennett Company, Taunton, Mass.; capital, $100,000; to manufacture staple silverware goods and sterling silver-plated ware.

Liddell, Bigelow Company, Manhattan; capital, $60,000. Manufacture and deal in metals, alloys and metal products. Incorporators, W. J. Liddell and R. Bigelow, Jr., New York.

The Colorado Springs Metal Company, Colorado Springs, Col.; capital, $100,000. Incorporators, Clarence D. Siegfried, Harry Leven and J. K. Vanatta, all of Colorado Springs.

Williams Brass Foundry, Brooklyn, N. Y.; capital, $7,000. To manufacture plumbing and sanitary fixtures and castings. Incorporators, Nathan Rothstein, Philip Cutler, Samuel Cutler and Paul Cutler, all of Brooklyn.

Aird-Coates-Carter Company, New York, embroidered goods, art and metal goods; capital, $6,000. Incorporators, Stella M. Aird, Frances M. Coates, Anna M. Carter, all of New York.

Louis Thompson Sales System, Chicago, Ill.; capital, $100,000; manufacturing and selling metal, wooden and composition goods. Incorporators, Louis M. Thompson, Charles Gilbert Haverley, John R. Lefevre.

The International Smelting and Refining Company has been incorporated in New Jersey, capital, $50,000,000, all common stock. Incorporators, Frederick Hoff, Richard C. Hunt and Nelson W. Runyon, all of New York.

Standard Metallic Packing Company, Omaha, Neb.; capital, $100,000. Articles of incorporation have been filed by John Badeker, A. V. Dresher, George Dresher, Walter Overmeyer, Joe Schranew and George Duncan.

Germania Cornice Works Company, Queens, N. Y.; capital, $5,000; to manufacture metal products and by-products. Incorporators, Paul Hilterich, Brooklyn; Geo. R. Casey, New York, and Sophie Schnabel, Queens.

R. Hamilton & Sons, Inc., Brooklyn, N. Y.; capital, $12,000. To manufacture brass articles, castings and models. Incorporators, Robert Hamilton, Joseph Hamilton, David A. Hamilton and John W. Hamilton, all of Brooklyn.

Breckwoldt Manufacturing Company, Newark, N. J.; iron, steel, tin, sheet metal, copper, galvanized iron, etc., general mercantile business; capital, $35,000. Incorporators, C. Q. Dean, F. Knowlton, A. F. Breckwoldt, New York City.

German American Bronze Powder Manufacturing Company, Manhattan; capital, $60,000; to manufacture bronze, gold, silver, aluminum and other powders. Incorporators, R. R. Thompson, G. Tumpson, F. A. Wagner, New York.

The Union Metallurgical Company, of New York, has been incorporated with a capital of $150,000, to manufacture alumina and aluminum. The incorporators are William F. Cox, Stanley R. Ketcham and George L. Lewis, all of New York.

Atlas Packing Company, New York, N. Y.; to manufacture and deal in metallic packing; capital, $20,000. Incorporators, Fred Ladu, Upper Montclair, N. J.; Hudson Dickerman and Geo. K. Louden, of New York, and R. G. Davy, White Plains, N. Y.

Detinning Company. Articles of incorporation have been filed under the laws of New Jersey by the Goldschmidt Detinning Company with an authorized capital of $3,000,000. The company was organized to detin scrap under Dr. Goldschmidts' detinning process.

Genesee Pump Company, Rochester, N. Y.; capital, $100,000; to deal in pumps and do a general foundry and machine business. Directors are John O. Roe, William H. Williams, of Rochester, and Thomas T. Graser, Chas. Howland and Geo. H. Smith, of Brighton.

Phelps, Dodge & Company, Inc., New York, N. Y.; capital, $50,000,000. The charter permits the firm to do a mining, mechanical and manufacturing business. Incorporators, James McLean, George B. Agnew, and E. Hayward Ferry, of New York. The directors are James Douglas, president; Cleveland H. Dodge, Arthur Curtiss James, and James McLean, vice-presidents; George Notman, secretary and treasurer. The other members of the directorate are George B. Agnew, E. Hayward Ferry, Francis L. Hine, and Wm. Church Osborne. This corporation succeeds the firm of Phelps-Dodge & Co., which has been dissolved. All the interests controlled by the old firm have been taken over by the new concern.

PRINTED MATTER

MOTORS. Chas. J. Bogue, New York, has issued a small folder referring to direct current motors manufactured by him.

LADLES. The S. Obermayer Company, Cincinnati, O., have issued a second edition of their special ladle catalogue with description of ladles of all styles and sizes from 30 to 40,000 lbs. capacity.

PRESSES. The Ferracute Machine Company, Bridgeton, N. J., have issued a catalogue of 16 pages giving full descriptions and illustrations of their many different kinds of presses including embossing, riveting, double and single-action drawing and coining presses.

ANTI-FRICTION METAL. C. W. Leavitt & Company, New York City, have issued a small folder giving formula for making brittannia, babbitt, pewter, linotype and electrotype metals. This information should prove valuable to those interested in standard mixtures of this character.

ELECTRIC CLEANING is the title of the 20-page circular issued by the Cleveland Platers' Supply Company, Cleveland, O., relating to their electric cleaning compound. Trial orders for this compound are earnestly solicited, and this company is particularly generous in this respect.

ROLLER BEARING. The Standard Roller Bearing Company of Philadelphia, Pa., have issued a catalogue No. 24 containing 190 pages, which gives full descriptions of their celebrated ball and roller bearings and also the roller thrust bearing which is particularly adapted for propellers of yachts.

SMELTERS. Theodore Hofeller & Company, of Buffalo, N. Y., have issued an announcement of their removal to new headquarters in the large offices and warehouses at Nos. 206-220 Scott street. They extend a cordial invitation to inspect their new plant in order to show the unexcelled facilities they have for doing business.

STORAGE BATTERIES. A 16-page leaflet has been issued by the Gould Storage Battery Company, 341 Fifth avenue, New York City, which relates to the uses of storage batteries. The leaflet fully explains their purposes and utilization to best advantage. The Gould battery is the one which is said to be most suitable for operation in plating plants.

THE S. OBERMAYER COMPANY, Cincinnati, Ohio, have issued a series of twelve post cards giving a pictorial history of the evolution of the iron industry. These cards are attractively printed in colors and are very interesing. A set may be obtained by addressing the publisher, The S. Obermayer Company, at either their Cincinnati, Chicago or Pittsburg offices.

CARBORUNDUM. The Carborundum Company, Niagara Falls, N. Y., have recently issued a very handsomely gotten-up catalogue of carborundum products. This catalogue is illustrated with handsome half-tones together with a description of the methods of producing carborundum, and they also include a complete price list of all of the various shapes of abrasive products manufactured by them.

WHITE METAL. The Hoyt Metal Company, of New York and St. Louis, have issued a handsome 32 page pamphlet describing their various products. They manufacture an alloy of particular acid resisting qualities in the form of sheet and pipe under the names of Hoyt Metal sheet and Hoyt Metal pipe. They also produce the famous lead wool which has revolutionized the manner of joining pipes. The book contains a number of valuable tables and some interesting data about metals.

BRASS MANUFACTURERS' CHUCK. An interesting pamphlet entitled "Expert Testimony by Expert People," and containing reproductions of letters from prominent concerns which recommend the Manufacturers' Chuck, is issued by W. L. Abate, 76 West Lincoln avenue, Mt. Vernon, N. Y. Strong endorsement is given these chucks in letters from E. Stebbins Manufacturing Company, Eddy Valve Company, Bay State Brass Company, Westinghouse Electric and Manufacturing Company, Monarch Brass Company, Neptune Meter Company, J. B. Colt Company, Edw. Schroeder Lamp Works and A. Schrader's Sons, Inc.

BRONZE "DEMO" is the title of a leaflet issued by the Scientific Metal Company, 299 Broadway, New York. The leaflet states that "Demo" is a special composition intended to replace bronzes in the manufacture of bearings and parts subject to friction in all kinds of machinery. It is particularly suitable for railroad and motor work. The leaflet gives a series of tables of official comparative tests made of different bearing metals. Metallurgists who have examined "Bronze Demo" pronounce it equal to some of the other celebrated bronze bearing metals.

ADNEWS—TWO COLOR

Every reader of THE METAL INDUSTRY should carefully examine the two-color display advertisements in this number and note the fine array of metals, machinery and supplies which are needed by the metal industry. The two color displays set forth the merits of the products of the respective makers to great advantage. Those advertisers represented and their products are:

Zucker & Leavett & Loeb Company, New York, mention their various products in fine style, including anodes, dynamos, the triplex buff, grinding and polishing material and the Rotoplater used in mechanical plating.

The Aluminum Company, of America, devote a striking page to their products.

Paige's Pots is a conspicuous slogan of the Paige Retort and Crucible Company, Taunton, Mass.

The J. W. Paxson Company, Philadelphia, show their various furnaces and brass foundry supplies.

Hermann Gehnrich, 518 Water street, New York, has a fine display of the Gehnrich sectional portable ovens.

The Dow Chemical Manufacturing Company, Mansfield, Ohio, call special attention to their Vienna lime, tripoli and crocus.

The J. D. Smith Foundry Supply Company, Cleveland, Ohio, set forth their brass foundry equipment and engineering ability.

The Rockwell Furnace Company, New York, illustrates a battery of tilting furnaces recently installed for one of their customers.

The Electric Smelting and Aluminum Company, Lockport, N. Y., continue to advertise manganese bronze, one of their well-known specialties.

Richards & Company, Incorporated, 200 Causeway street, Boston, Mass., mention that they will celebrate their 100th anniversary in the course of three short years.

The Monarch Engineering and Manufacturing Company, Baltimore, point out, in their usual lively fashion, the advantages of Steele-Harvey crucible melting furnaces.

O. J. Moussette Company, Driggs avenue corner N. 10th street, Brooklyn, N. Y., call attention to their well known crusher which is being thoroughly introduced in the foundry trade.

Bennett & O'Connell Company 97-99-101 So. Clinton street, Chicago, Ill., illustrate and describe their No. 10 polishing and buffing lathe and mention their complete electroplating outfits.

Stanley Doggett, 101 Beekman street, New York, describes the troubles of foundrymen who use inferior parting compounds, and gives some information about Doggett's Perfection Parting.

Turner Machine Company, 2049 North Second street, Philadelphia, Pa., have a fully illustrated page of their various ma-

chinery, including cock grinders, molding machines, sand sifters and mixers.

W. L. Abate, 76 West Lincoln avenue, Mt. Vernon, N. Y., gives a list of prominent manufacturing concerns now using the manufacturing chuck and calls attention to the saving it effects in handling brass goods.

John Hassall, Inc., 183 Lafayette street, New York, whose business was established in 1850, mentions his various rivets, escutcheon pins, etc., very useful and necessary articles for every metal goods manufacturer.

Galvanizing pots, kettles, galvanizing plants, galvanizing boxes, is the announcement of Wilfong Brothers, Philadelphia, Pa., who are known all over the entire country for their ability to instal galvanizing equipment.

R. F. Lang, 31 and 33 Broadway, New York, calls attention to the various grades of phosphor copper and other alloys which he sells, of which he makes a specialty and which are pronounced by experts to be of excellent quality.

ADNEWS—ONE COLOR

Yellow brass ingots, composition brass ingots and formula, is the announcement of McLaughlin's Sons Company, Brooklyn, N. Y.

The Ajax Metal Company, Philadelphia, Pa., have again taken space in our advertising pages and announce that they are headquarters for high grade ingot metals of every description.

Philip Sievering, 213 Centre street, New York city, announces that he is ready to do electroplating, polishing and buffing, acid dipping and lacquering, jobbing of all kinds in all of its branches.

Nickel salts, amyl acetate, cyanide potash, bismuth, cadmium for the use of platers and brass manufacturers is the announcement of McKesson & Robbins, of New York. Correspondence is solicited by this firm.

Benj. Middleditch, of Detroit, Mich., manufacturer of both brass founders' and finishers' machinery, announces that he has made a specialty of this for years, and some of his latest products will be found in our advertising pages.

The Sandoval Zinc Company, East St. Louis, Ill., have established a chemical department where they manufacture chloride of zinc, soldering flux and commercial zinc salts which they mention are indispensable for aluminum founders.

Two new types of sand blasts are advertised in this issue, one manufactured by Batcheller, Clark & Batcheller, Inc., 141 Cedar street, New York, and the other by A. Jorn, Jr., Waukegan, Ill. Further information may be obtained from our advertising pages.

The Baird Machine Company, Oakville, Conn., is continually selling its barrels to the various branches of the metal industry and reports the sale of a number since they have taken METAL INDUSTRY space. Further particulars will be found on another page of this issue.

The Morgan Construction Company, Worcester, Mass., call attention on another page to their wire mill equipment for copper, steel, brass and miscellaneous alloys, including bull blocks, drawing frames, muffle and pot annealers, etc. The Morgan Company have put their wire drawing machinery in some of the largest mills in the country.

Manganese metal fused 98-99% pure, managenese copper, phosphor copper silicon copper, are announced by the Roessler & Hasslacher Chemical Company, 100 William street, New York, as their specialties. Other metals that they handle are aluminum, bismuth, cadmium, calcium, cobalt, magnesium, nickel. The purity of the company's various products is guaranteed.

"When the wheel stops the belt stops too" is the announcement of the New Britain Machine Company, New Britain, Conn., regarding its "Whitney" polishing lathe. Full particulars of this lathe, which is announced to be a power saver and a great improvement over the common type, can be obtained from the company by writing for catalogue "T. M. I."

METAL MARKET REVIEW FOR 1908

NEW YORK, January 11, 1909.

COPPER.—The London market for standard copper does not show any very wide fluctuations during the year just closed. Spot copper opened at £61 10s., dropped to £56 5s. during the first quarter and gradually rose to £64 17s. 6d. on the election boom, closing at £63 10s., making a net advance for the year of about £2 per ton.

These London prices for standard copper are not in any way indicative of the legitimate consuming demand for the red metal. The London market has been advanced by buying orders from New York operators with the direct object and for the express purpose of raising the New York prices, and at the same time advancing the price of Amalgamated on the Stock Exchange. This practice of lifting the New York copper market (and incidentally Amalgamated) through buying orders in the London standard market has become so common that it is now always a question in the trade whether the advance of copper on the New York Metal Exchange is for Stock Exchange purposes or a legitimate advance warranted by existing conditions in the copper trade.

The year 1908 has been a disappointment as far as general recovery in trade was concerned, but according to the advances in the stock market over the low prices of 1907 we are coming into a good business year and all will be interested in helping to make good Wall street's confidence in the future of the country.

The copper market during the year has been dull and uneventful, with prices at the close about ½c. higher than a year ago.

The production of copper is now running ahead of consumption, and despite the shut-down of the heaviest producing mines during the first quarter of 1908 (Amalgamated mines started producing in March, but other mines did not resume operations till later) the production for 1908 was over 50 million pounds in excess of 1907, according to Government estimates. It is to be noted that several new mines are now producing considerable quantities of copper and 1909 promises to be a record year in the production of copper. We began the year 1908 with a stock of 120,000,000 pounds, and according to Government estimates we have a stock of copper including stocks at smelter and refined copper of 350,000,000 pounds on January 1, 1909. The Government figures conclusively show that the refineries did not keep pace with the smelters, but whether the copper was refined or not the stock apparently exists and is held at the smelting plants.

The exports for December were 21,590 tons, against 37,685 tons for the same month last year, making the total exports for 1908 289,943 tons, against 228,836 tons in 1907.

The price movement during 1908 was not very extensive. Lake copper a year ago was around 14c., during February prices dropped to the lowest point of the year, 12½c., on persistent selling by one of the larger interests, during March the price advanced to 13½c., prices fluctuated slightly between 13½c. and 12¾c., when an active buying movement in August helped to push prices up close to 14c. With the election drawing near and the general uncertainty prices fell off slightly till the end of October and with a buying movement starting around election time prices were marked up very sharply until about the middle of November, when the general public woke up to the fact that although Taft was elected the business of the country was no better than during the month of October and not as good as the month of either August or September. Conditions are undoubtedly improving every day, but the improvement is certain to be

slow. The copper market to-day is in fairly good shape with Lake at 14⅝, Electrolytic 14⅛ and casting brands at 14¼, carload lots.

TIN.—The London tin market shows a net advance over the year of about £12 per ton. Spot tin in London opened at £121, dropped to £118 and advanced to £146 15s., closing at £132.

The New York tin market during the year has duly followed the London fluctuations without any interesting developments in the home market.

The consumption for the 12 months of 1908 shows a decrease of 1,600 tons, compared with 1907. The total shipments from the Straits for 1908 show an increase of 8,032 tons over 1907, and the total visible supply at the end of 1908 shows an increase of nearly 8,000 tons over 1907. These figures are not very bullish, but with the expected increase in consumption in America higher prices are generally expected after the end of January.

The price of tin in New York to-day is around 28c. for 5-10 ton lots, with futures 10 to 15 points higher.

LEAD.—Lead is the only metal besides silver that does not show an advance for the year. London prices opened at £14 12s. 6d. and after advancing to £15 closed at £13.

In the New York market lead has ruled fairly steady all the year. The production of lead for 1908 is estimated at 391,000 tons, against 414,000 tons in 1907. The Lead Trust has not been such a powerful factor in the market as heretofore, partly owing, probably, to the increase in other hands and possibly to the threatened tariff revision.

The general impression in the trade is that the duty now existing in lead of 2⅛c. can be reduced to 1c. without injury to any "infant industry," and a majority of the trade would like to see free lead and a free market to American citizens of an American product that is now controlled by a lot of foreigners to the detriment of American consumers.

The price of lead to-day is about 4.25 New York, carload lots, or about 4.10 East St. Louis.

SPELTER.—The foreign spelter market shows a net advance for the year of about £2 per ton.

The New York market has ruled fairly steady during the year with slight fluctuations. Opening at 4.35 New York, prices declined 15 points to 4.20 and advanced to the closing price of 5.15 New York, carload lots, with price at East St. Louis of 5c., against 4.20 a year ago.

ANTIMONY.—Antimony has been one of the dullest metals in the market. A year ago Hallett's in London was quoted at £34 and to-day the price is £33, and this price is against £112, the high prices in 1906-07.

The New York market has been dull and uninteresting with consumers buying for their immediate wants and no speculative deals by outsiders. Cookson's to-day is 8c., with Hallett's at 8⅛c.; other brands at 7½ to 7¾.

ALUMINUM.—The prices for this metal have gradually been brought down to a more normal basis and the price to-day in London is the same as the price of Electrolytic copper, namely 14c., so that aluminum, for electrical purposes in the form of wire, costs less than the same amount of copper wire. The conductivity of aluminum is not that of copper and the tensile strength is also below copper, but at the same price as copper aluminum can be used in a wider range and more economically than copper at to-day's prices.

The year opened with the price of aluminum in ingots 99 per cent. pure selling here at 34c. and this price was held until certain patents expired abroad, when the price there broke to about 14c. and importations of aluminum began. This brought the price down to around 24c. per pound for small lots and about 1c. lower for one-ton lots. At the close the market is faily active, with importations making the actual market and the one producer in this country meeting the price. There is a duty of 8c. per pound on this metal. At the close of the year the price is nominal at 24c. for one-ton lots, with the base price of wire and rods at 33c. and sheets at 34c. pound.

SILVER.—The price of this metal shows an almost continuous decline during the year just closed. Silver opened at around 55c. in New York and 25¾d. in London and closed at 50¼c. in New York and 23 3/16d. in London. The lowest points reached in years were during the months of November and December and the market closed at about 3c. above the lowest. The average for the year, 52.864c. New York, was the lowest since 1903.

This decline in silver is partly accounted for by the decreased demand and an increase in the supplies from China and Australia. Purchases by the Government were much smaller in 1908 than 1907. In 1907 the purchases amounted to 14,776,500 ozs., while the total purchases in 1908 only amounted to 5,103,300 ozs.

QUICKSILVER.—The prices for quicksilver have shown a slight improvement for the year. Wholesale lots of 100 flasks are held at $45 per flask, with smaller lots at $46 to $46.50 per flask.

PLATINUM.—The platinum market is controlled by an English and French syndicate and prices are raised as the rate of demand warrants. The year 1908 has seen considerable fluctuations in prices here. Owing to a new element in the business prices were cut very sharply for a time, but at present writing the different interests have agreed to hold the price at a fair margin of profit and the consumer will suffer in consequence.

The market closes to-day at $23.50 for ordinary to $25.50 for hard containing a slight percentage of iridium.

SHEET METALS.—The base price of sheet copper is 19c. to-day, with copper wire at 15.75c. base, and seamless brass tubing at 19c. base. The price of wire is made on a basis of 14c. for ingot copper and may stand until legitimate business warrants a further advance in the price of ingot copper.

OLD METALS.—The old metal market has been dull and uninteresting from a buyer's or seller's point of view. Any advance in copper prices was the signal for a firmer tone to all copper and brass scrap and any decline was a case of the blues for the entire trade. With Taft elected the old metal trade had a crazy boom for about a week and prices were run up regardless of the laws of supply and demand, prices were lifted about 1½c. per pound, and at the end of it consumers were able to stay out of the market until prices were down again to a more normal basis. The prices to-day are about ½c. per pound higher than a year ago.

THE DECEMBER MOVEMENTS IN METALS

	Highest.	Lowest.	Average.
COPPER.			
Lake	14.50	14.35	14.50
Electrolytic	14.25	14.15	14.25
Casting	14.12½	14.00	14.10
TIN	29.65	28.75	29.15
LEAD	4.35	4.15	4.25
SPELTER	5.15	5.10	5.25
ANTIMONY (Halletts)	8.15	8.15	8.15

SHEET METAL MOVEMENTS YEARS 1906—1907—1908

Highest and lowest base prices (in cents per lb.) on sheet brass, sheet copper and sheet German silver.

	1906.		1907.		1908.	
	High.	Low.	High.	Low.	High.	Low.
Sheet brass	22.00	18.15	23.75	14.25	16.00	13.25
Sheet copper	29.00	23.00	32.00	20.00	20.00	17.00
Sheet German silver, 18%	37.50	31.00	39.00	29.50	32.50	24.50

DAILY METAL PRICES

We have made arrangements with the New York Metal Exchange by which we can furnish our readers with the Official Daily Metal Market Report of the Exchange and a year's subscription to THE METAL INDUSTRY for the sum of $10. The price of the report alone is $10. Sample copies furnished for the asking. We can also furnish daily telegraphic reports of metal prices.

Trade Wants on Advertising Pages 38 Following

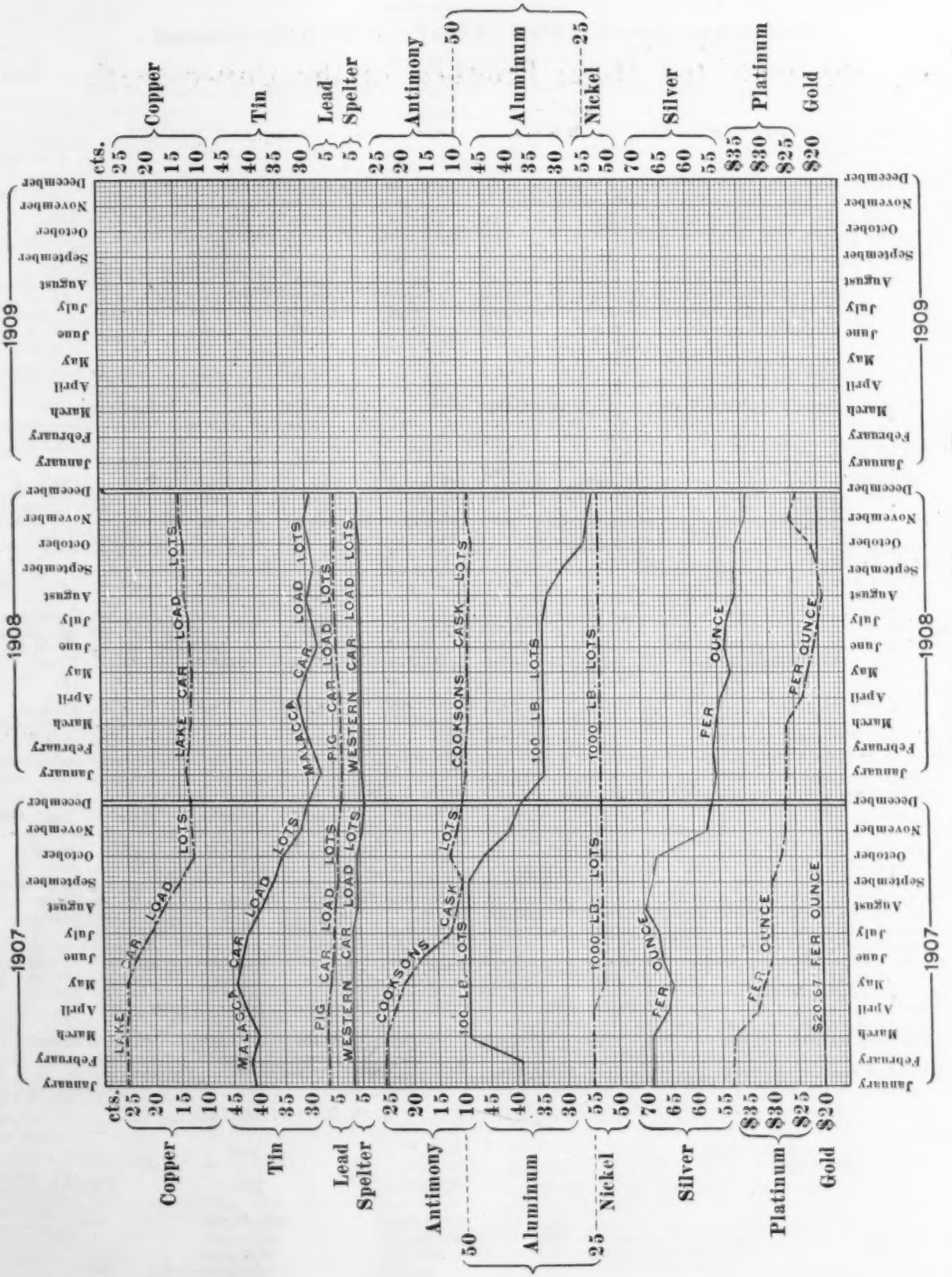


CHART OF METAL PRICES

THE METAL INDUSTRY

Pig Iron and Metal Products of the United States

Calendar Years 1899–1907. (1908 Estimated).

(FROM THE UNITED STATES GEOLOGICAL SURVEY.)

PRODUCTS. METALLIC.	1899. Quantity.	1899. Value.	1900. Quantity.	1900. Value.	1901. Quantity.	1901. Value.	Products.
Pig iron (spot value) long tons	13,620,703	$245,172,654	13,789,242	$259,944,000	15,878,354	$242,174,000	Pig iron.
Silver, commercial value, troy ounces	54,764,500	32,858,700	57,647,000	35,741,100	55,214,000	33,128,400	Silver.
Gold, coining value, troy ounces	3,437,210	71,053,400	3,829,897	79,171,000	3,805,500	78,666,700	Gold.
Copper, value at New York City, pounds	568,666,921	101,222,712	606,117,166	98,494,039	602,072,519	87,300,515	Copper.
Lead value at New York City, short tons	210,500	18,945,000	270,824	23,561,688	270,700	23,280,200	Lead.
Zinc, value at New York City, short tons	129,051	14,840,865	123,886	10,654,196	140,822	11,265,760	Zinc.
Quicksilver, value at San Francisco, flasks	30,454	1,452,745	28,317	1,302,586	29,727	1,382,305	Quicksilver.
Aluminum, value at Pittsburg, pounds	6,500,000	1,716,000	7,150,000	1,920,000	7,150,000	2,238,000	Aluminum.
Antimony, value at S. F'cisco, short tons	2,861	559,189	4,226	837,896	2,639	539,902	Antimony.
Nickel, value at Philadelphia, pounds	22,541	8,566	9,715	3,886	6,700	3,551	Nickel.
Tin, pounds	.....	.....	.....	.....	.....	.....	Tin.
Platinum, value (crude) at New York City, troy ounces	300	1,800	400	2,500	1,408	27,526	Platinum.
Total value of metallic products	.....	$487,831,631	.....	$511,632,891	.....	$480,006,959	

PRODUCTS. METALLIC.	1902. Quantity.	1902. Value.	1903. Quantity.	1903. Value.	1904. Quantity.	1904. Value.	Products.
Pig iron (spot value) long tons	17,821,307	$372,775,000	18,009,252	$344,350,000	16,497,033	$233,025,000	Pig iron.
Silver, commercial value, troy ounces	55,500,000	29,415,000	54,300,000	29,322,000	57,682,800	33,456,000	Silver.
Gold, coining value, troy ounces	3,870,000	80,000,000	3,560,000	73,591,700	3,892,480	80,464,700	Gold.
Copper, value at New York City, pounds	659,508,644	76,568,954	698,044,517	91,506,006	812,537,267	105,629,845	Copper.
Lead, value at New York City, short tons	270,000	22,140,000	282,000	23,520,000	307,000	26,402,000	Lead.
Zinc, value at New York City, short tons	156,927	14,625,596	159,219	16,717,995	186,702	18,670,200	Zinc.
Quicksilver, value at San Francisco, flasks	34,291	1,467,848	35,620	1,544,934	34,570	1,503,795	Quicksilver.
Aluminum, value at Pittsburg, pounds	7,300,000	2,284,590	7,500,000	2,284,900	8,600,000	2,477,000	Aluminum.
Antimony, value at S. F'cisco, short tons	3,561	634,506	3,128	548,433	3,057	505,524	Antimony.
Nickel, value at Philadelphia, pounds	5,748	2,701	114,200	45,900	24,000	11,400	Nickel.
Tin, pounds	.....	.....	.....	.....	.....	.....	Tin.
Platinum, value (crude) at New York City, troy ounces	94	1,814	110	2,080	200	4,160	Platinum.
Total value of metallic products	.....	$599,916,009	.....	$583,433,948	.....	$502,149,624	

PRODUCTS. METALLIC.	1905. Quantity.	1905. Value.	1906. Quantity.	1906. Value.	1907. Quantity.	1907. Value.	Products.
Pig iron (spot value) long tons	22,992,380	$382,450,000	25,307,191	$505,700,000	25,781,361	$529,958,000	Pig iron.
Silver, commercial value, troy ounces	56,101,600	34,221,976	56,517,900	38,256,400	56,514,700	37,299,700	Silver.
Gold, coining value, troy ounces	4,265,742	88,180,700	4,565,333	94,373,800	4,374,827	90,435,700	Gold.
Copper, value at New York City, pounds	901,907,843	139,795,716	917,805,682	$177,595,888	868,996,491	173,799,300	Copper.
Lead, value at New York City, short tons	302,000	28,690,000	350,153	39,917,442	365,166	38,707,596	Lead.
Zinc, value at New York City, short tons	203,849	24,054,182	199,694	24,362,668	223,745	26,401,910	Zinc.
Quicksilver, value at San Francisco, flasks	30,451	1,103,120	26,238	958,634	21,567	828,931	Quicksilver.
Aluminum, value at Pittsburg, pounds	11,347,000	3,246,300	14,910,000	4,262,286	17,211,039	4,926,948	Aluminum.
Antimony, value at S. F'cisco, short tons	3,240	705,787	1,766	602,949	2,022	622,046	Antimony.
Nickel, value at Philadelphia, pounds	.....	.....	.....	.....	.....	.....	Nickel.
Tin, pounds	.....	.....	.....	35,600	.....	33,285	Tin.
Platinum, value (crude) at New York City, troy ounces	318	5,320	1,439	45,189	357	10,589	Platinum.
Total value of metallic products	.....	$702,453,101	.....	$886,110,856	.....	$903,024,005	

FROM THE ENGINEERING AND MINING JOURNAL (ESTIMATED).

PRODUCTS. METALLIC.	1908. Quantity.	Value. Total.	Value. Per Unit.
Pig iron, long tons	15,828,000	$268,284,600	16.95
Copper, pounds	952,395,477	127,849,569	0.13424
Gold ounces fine	4,659,562	96,313,256	20.67
Lead, short tons	323,841	27,202,644	84.00
Quicksilver, flasks	20,000	840,000	42.00
Silver, ounces fine	51,798,053	27,382,523	0.52864
Zinc, short tons	207,735	19,635,112	94.52

Metal Prices, January 15, 1909.

NEW METALS.

	Price per lb. Cents.
COPPER—PIG, BAR AND INGOT AND OLD COPPER. Duty Free. Manufactured 2½c. per lb.	
Lake, car load lots	14.62½
Electrolytic, car load lots	14.50
Castings, car load lots	14.25
TIN—Duty Free.	
Straits of Malacca, car load lots	28.00
LEAD—Duty Pigs, Bars and Old, 2⅛c. per lb.; pipe and sheets, 2½c. per lb.	
Pig lead, car load lots	4.25
SPELTER—Duty 1½c. per lb.	
Western, car load lots	5.20
ALUMINUM—Duty Crude, 8c. per lb. Plates, sheets, bars and rods, 13c. per lb.	
Small lots	28.00
100 lb. lots	25.00
Ton lots	24.00
ANTIMONY—Duty ¾c. per lb.	
Cookson's cask lots, nominal	8.12½
Hallett's, cask lots	8.00
Other cask lots	7.60
NICKEL—Duty, 6c. per lb.	
Shot, Plaquettes, Ingots, Blocks, according to quantity	.45 to .60
MANGANESE METAL—Duty 20%	.80
MAGNESIUM METAL—Duty free	1.30
BISMUTH—Duty free	1.80
CADMIUM—Duty free	1.00
	Price per oz.
GOLD—Duty free	$20.67
SILVER—Duty free	.50¼
PLATINUM—Duty free	24.50
QUICKSILVER—Duty 7c. per lb. Price per pound	62c. to 63c.

OLD METALS.

	Price per lb. Cents.	
Heavy Cut Copper	12.00	12.50
Copper Wire	11.50	12.00
Light Copper	11.00	11.50
Heavy Mach. Comp.	11.50	12.00
Heavy Brass	8.00	9.00
Light Brass	6.00	7.00
No. 1 Yellow Brass Turnings	8.00	8.50
No. 1 Comp. Turnings	9.50	10.00
Heavy Lead	3.80	4.00
Zinc Scrap	3.00	3.50
Scrap Aluminum, turnings	6.50	7.00
Scrap Aluminum, cast, alloyed	13.00	16.00
Scrap Aluminum, sheet (new)	16.00	18.00
Old Nickel, solid	19.00	23.00
No. 1 Pewter	18.00	19.00

INGOT METALS.

	Price per lb. Cents.
Silicon Copper 10% to 20%....according to quantity	28 to 30
Silicon Copper, 30%, guaranteed " "	30 to 32½
Phosphor Copper, 5% " "	19 to 21
Phosphor Copper, 10% to 15%, guaranteed " "	28 to 30
Manganese Copper, 30% " "	30 to 35
Phosphor Tin " "	34 to 36
Brass Ingot, Yellow " "	10 to 11
Brass Ingot, Red " "	12 to 14
Bronze Ingot " "	11 to 13
Manganese Bronze " "	17 to 19
Phosphor Bronze " "	13 to 16
Casting Aluminum Alloys " "	29 to 35

PHOSPHORUS—Duty 18c. per lb.
According to quantity ..... 32 to 40

PRICES OF SHEET COPPER.

BASE PRICE, 19 Cents per Lb. Net.

PRICES MENTIONED BELOW ARE FOR QUANTITIES OF 100 LBS. AND OVER.

SIZE OF SHEETS.		64 oz. and over 50 lb. sheet 30 x 60 and heavier.	32 oz. to 64 oz. 25 to 50 lbs. sheet 30 x 60.	24 oz. to 32 oz. 18¾ to 25 lb. sheet 30 x 60.	16 oz. to 24 oz. 12½ to 18¾ lb. sheet 30 x 60.	14 oz. and 15 oz. 11 to 12½ lb. sheet 30 x 60.	12 oz. and 13 oz. 9½ to 11 lb. sheet 30 x 60.	10 oz. and 11 oz. 7¾ to 9½ lb. sheet 30 x 60.	8 oz. and 9 oz. 6¼ to 7¾ lb. sheet 30 x 60.	Lighter than 8 oz.
		Cents Per Pound Over Base Price for Soft Copper.								
Not wider than 30 ins.	Not longer than 72 inches.	Base	Base	Base	Base	1	2	3	6	9
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	1	3	6	9	
	Longer than 96 inches.	"	"	"	"	2	6			
Wider than 30 ins. but not wider than 36 inches.	Not longer than 72 inches.	"	"	"	"	2	4	7	10	
	Longer than 72 inches. Not longer than 96 inches.	"	"	"	"	2	6	9		
	Longer than 96 inches. Not longer than 120 inches.	"	"	"	1	3				
	Longer than 120 inches.	"	"	1	2					
Wider than 36 ins. but not wider than 48 inches.	Not longer than 72 inches.	"	"	1	2	4	7	10		
	Longer than 72 inches. Not longer than 96 inches.	"	"	1	3	5	8			
	Longer than 96 inches. Not longer than 120 inches.	"	"	2	4	8				
	Longer than 120 inches.	"	1	3	6					
Wider than 48 ins. but not wider than 60 inches.	Not longer than 72 inches.	"	Base	1	3	6	11			
	Longer than 72 inches. Not longer than 96 inches.	"	"	2	4	9				
	Longer than 96 inches. Not longer than 120 inches.	"	1	3	6					
	Longer than 120 inches.	1	2	4	8					
Wider than 60 ins. but not wider than 72 ins.	Not longer than 96 inches.	Base	1	3	8					
	Longer than 96 inches. Not longer than 120 inches.	"	2	5	10					
	Longer than 120 inches.	1	3	8						
Wider than 72 ins. but not wider than 108 ins.	Not longer than 96 inches.	1	3	6						
	Longer than 96 inches. Not longer than 120 inches.	2	4	7						
	Longer than 120 inches.	3	5	9						
Wider than 108 ins.	Not longer than 132 inches.	4	6							
	Longer than 132 inches.	5	8							

The longest dimension in any sheet shall be considered as its length.

CIRCLES, SEGMENTS AND PATTERN SHEETS, advance over prices of Sheet Copper required to cut them from. 3 cents per pound.

COLD OR HARD ROLLED COPPER, 14 oz. per square foot, and heavier, add 1 " " "

COLD OR HARD ROLLED COPPER, lighter than 14 oz., per square foot, add 2 " " "

POLISHED COPPER, 20 INCHES WIDE and under, advance over price for Cold Rolled Copper of corresponding dimensions and thickness 1 " " "

POLISHED COPPER, WIDER THAN 20 INCHES, advance over price for Cold Rolled Copper of corresponding dimensions and thickness 2 " " "

COLD ROLLED COPPER, PREPARED SUITABLE FOR POLISHING, same as Polished Copper of corresponding dimensions and thickness.

COLD ROLLED AND ANNEALED COPPER SHEETS OR CIRCLES, same price as Cold or Hard Rolled Copper of corresponding dimensions and thickness.

ROUND COPPER ROD, ⅜ inch diameter or over ..... Base Price.

(Rectangular, Square and Irregular Shapes, Copper Rod, Special Prices.)

	Price per lb.
ZINC—Duty, sheet, 2c. per lb.	
Mill price, carload lots	7.00 less 8%
Open casks	8.50

Metal Prices, January 15, 1909

PRICES ON BRASS MATERIAL—MILL SHIPMENTS.

In effect Nov. 16, 1908, and until further notice.

To customers who purchase less than 40,000 lbs. per year and over 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.15	$0.17¼	$0.19¾
Wire	.15¼	.17½	.19⅝
Rod	.15¼	.17½	.20⅛
Brazed tubing	.21½	—	.24⅝
Open seam tubing	.19½	—	.22⅝
Angles and channels, plain	.20¾	—	.24¼

30% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	⅜c.	per lb. net advance
" —Best spring, drawing and spinning brass....	1½c.	" " " "
Wire—Extra spring and brazing wire	⅜c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

To customers who purchase less than 5,000 lbs. per year.

	Net base per lb. High Brass.	Low Brass.	Bronze.
Sheet	$0.16	$0.18¼	$0.20⅝
Wire	.16¼	.18½	.20⅞
Rod	.16¼	.18½	.21⅛
Brazed tubing	.22½	—	.25⅛
Open seam tubing	.20½	—	.23⅛
Angles and channels, plain	.21¾	—	.25¼

5% discount from all extras as shown in American Brass Manufacturers' Price List No. 7.

NET EXTRAS FOR QUALITY.

Sheet—Extra spring, drawing and spinning brass...	⅜c.	per lb. net advance
" —Best spring, drawing and spinning brass....	1½c.	" " " "
Wire—Extra spring and brazing wire	⅜c.	" " " "
" —Best spring and brazing wire	1c.	" " " "

BARE COPPER WIRE—CARLOAD LOTS.

15¾c. per lb. base.

SOLDERING COPPERS.

300 lbs. and over in one order	18½c. per lb. base.
100 lbs. to 300 lbs. in one order	19c. " " "
Less than 100 lbs. in one order	20½c. " " "

PRICES FOR SEAMLESS BRASS TUBING.

From 1¼ to 3½ in O. D. Nos. 4 to 13 Stubs' Gauge, 19c. per lb.
Seamless Copper Tubing, 23c. per lb.

For other sizes see Manufacturers' List.

PRICES FOR SEAMLESS BRASS TUBING Iron Pipe Sizes.

Iron Pipe Size	⅛	¼	⅜	½	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
Price per lb.	27	26	21	20	19	19	19	19	19	19	19	20	21	23	25	26

PRICE LIST OF IRON LINED TUBING—NOT POLISHED.

	Per 100 feet. Brass.	Bronze.
⅜ inch	$8	$9
½ inch	8	9
⅝ inch	10	11
¾ inch	12	13
⅞ inch	14	15
1 inch	18	20
1¼ inch	22	24
1¼ inch	25	27
1½ inch	32	35
1¾ inch	45	48
2 inch	56	60

Discount 45 and 5%.

PRICES FOR MUNTZ METAL AND TOBIN BRONZE.

Muntz or Yellow Metal Sheathing (14" x 48")	16c. lb. net base
" " " Rectangular Sheets other than Sheathing	18c. " " "
" " " Rod	17c. " " "
Tobin Bronze Rod	18c. " " "

Above are for 100 lbs. or more in one order.

PLATERS' METALS.

Platers' bars in the rough, 24¼c. net.

German silver platers' bars dependent on the percentage of nickel, quantity and general character of the order.

Platers' metal, so called, is very thin metal not made by the larger mills and for which prices are quoted on application to the manufacturers.

PRICES FOR SHEET BLOCK TIN AND BRITANNIA METAL.

Not over 18 in. in width, not thinner than 23 B. S. Gauge, 4c. above price of pig tin in same quantity.

Not over 35 in. in width, not thinner than 22 B. S. Gauge, 5c. above price of pig tin.

PRICE LIST FOR SHEET ALUMINUM—B. & S. Gauge.

	Wider than..... and including..... in coils.	3in. 12in.	6in. 14in.	14in. 16in.	16in. 18in.	18in. 20in.	20in. 24in.	24in. 30in.	30in. 36in.	36in. 40in.
No.	13 and heavier	34	34	36	36	36	36	39	39	39
"	14	34	34	36	36	36	36	39	39	39
"	15	34	34	36	36	36	36	39	39	39
"	16	34	34	36	36	36	36	39	39	39
"	17	34	34	36	36	36	36	39	39	39
"	18	34	34	36	36	36	36	39	39	42
"	19	34	34	36	36	36	36	39	40	43
"	20	34	36	36	36	36	38	41	42	44
"	21	34	38	38	38	38	40	43	44	50
"	22	34	38	38	38	40	40	43	47	51
"	23	34	38	38	38	40	40	43	49	52
"	24	34	38	40	42	42	42	45	51	54
"	25	36	39	41	43	43	43	46	53	57
"	26	36	39	42	46	46	46	51	55	61
"	27	36	40	44	48	48	49	54	58	64
"	28	36	40	46	48	49	49	56	62	67
"	29	38	41	48	50	52	52	61	67	72
"	30	38	42	50	52	56	62	69	72	77
"	31	43	47	55	58	63	71	74	77	83
"	32	45	49	57	61	69	77	91	90	95
"	33	47	51	60	65	73	84	91	100	110
"	34	50	55	62	70	78	91	103	110	120
"	35	..	65	70	80	90	100	115	125	..
"	36	..	80	90	100	115	120	135	..	..
"	37	..	104	114	129	144	159	174	..	..
"	38	..	124	139	154	169	184	204	..	..
"	39	..	144	164	184	204	224	..	..	..
"	40	..	174	204	224	244	..	..	..	..

In flat rolled sheets the above prices refer to lengths between 2 and 8 feet. Prices furnished by the manufacturers for wider and narrower sheet. All columns except the first refer to flat rolled sheet. Prices are 100 lbs. or more at one time. Less quantities 5c. lb. extra. Charges made for boxing.

PRICE LIST SEAMLESS ALUMINUM TUBING.

STUBS' GUAGE THE STANDARD. SIZES CARRIED IN STOCK.

Outside Diameters. BASE PRICE, 25 Cents per Pound.

Stubs' Guage.	Inches.	¼ in.	5-16 in.	⅜ in.	½ in.	⅝ in.	¾ in.	⅞ in.	1 in.	1¼ in.	1½ in.	1¾ in.	2 ins.	2½ ins.	3 ins.	3½ ins.	4 ins.	4½ ins.
11.	.120.	..	..	..	..	..	..	..	26	23	..	..	13	11	9	8	15	22
12.	.109.	..	..	..	..	..	..	..	25	..	..	..	14	..	..	..	..	..
14.	.083.	..	..	..	..	..	..	..	..	..	..	..	16	..	..	..	..	..
16.	.065.	..	..	..	..	..	27	26	26	23	22	20	20	20	20	26	30	56
18.	.049.	..	..	..	..	32	29	28	27	24	25	25	25	..	..	..	..	..
20.	.035.116	..	45	38	33	32	31	29	28	28	29	29	29	30	37	48	57	80
21.	.032.	..	..	..	39	..	..	..	..	..	..	..	..	..	..	..	..	..
22.	.028.137	97	47	41	37	36	34	33	..	..	44	..	..	..	..	..	..	..
24.	.022.187	132	107	87	78	72	61	59	65	..	..	..	..	..	..	..	..	..

Prices are for ten or more pounds at one time. For prices on sizes not carried in stock send for Manufacturers' List.

PRICE LIST FOR ALUMINUM ROD AND WIRE.

Diameter. B. & S. G'ge.	000 to No. 10.	No. 11.	No. 12.	No. 13.	No. 14.	No. 15.	No. 16.	No. 17.	No. 18.	No. 19.	No. 20.	No. 21.	No. 22.
Price, per lb. ...	32	32½	32½	33	33½	34	34½	35	36	37	38	43	46

200 lbs. to 30,000 lbs., 3 cents off list; 30,000 lbs. and over, 4 cents off list.

PRICE LIST FOR GERMAN SILVER IN SHEETS AND ROLLS.

Per cent.	Price per lb.	Per cent.	Price per lb.
12	$0.52	16	$0.58
13	.53	17	.59
14	.54	18	.60
15	.55		

These prices are for sheets and rolls over 2 inches in width, to and including 8 inches in width and to No. 20, inclusive, American or Brown & Sharpe's Gauge. Prices are for 100 lbs. or more of one size and gauge in one order. Discount 50%.

GERMAN SILVER TUBING.

4	per cent.	to No. 19,	B. & S. Gauge, inclusive	$0.60
6	"	" 19,	" " "	.70
9	"	" 19,	" " "	.85
12	"	" 19,	" " "	1.00
15	"	" 19,	" " "	1.15
16	"	" 19,	" " "	1.20
18	"	" 19,	" " "	1.30

German Silver Tubing thinner than No. 19 B. & S. Gauge add same advances as for Brazed Brass Tube.

For cutting to special lengths add same advances as for Brazed Brass Tube. Discount 40%.

PRICE OF SHEET SILVER.

Rolled sterling silver .925 fine is sold according to gauge quality and market conditions. No fixed quotations can be given as prices range from 2c. below to 6c. above the price of bullion.

Rolled silver anodes .999 fine are quoted at 2c. above the price of bullion for large buyers.

METALLIC ALLOYS COMPANY

50 Church Street, NEW YORK CITY

If it should happen to be a matter of price, quality, or of getting it NOW, no matter what metal or alloy you want

ASK US.

30% MANGANESE COPPER is an alloy of considerable importance to Brass Foundrymen, whether or not they make Manganese Bronze.

WE ARE

prepared to ship AT ONCE—meaning the same day order is received

---

Manganese Di-Oxide

30% Manganese-Copper
30% Silicon-Copper
Aluminum
Antimony
80% Ferro-Manganese
Outerbridge Silicon Alloys
70% Ferro-Chrome
25/30% Silicon-Manganese

BRASS FOUNDERS' SUPPLIES

You may safely send us an open order

SEE NEXT PAGE FOR WANT ADVERTISEMENTS

TRADE WANTS

AN EXCHANGE FOR THE WANTS OF THE METAL TRADES.

Advertisements will be inserted under this head at 40 cents per line, 3 lines one dollar, for each insertion, excepting Situations Wanted, 20 cents per line, 3 lines half a dollar. Answers sent in our care will be forwarded.

METALS, MACHINERY AND SUPPLIES FOR SALE

PLATING DYNAMOS, also Alternating and direct current motors and dynamos at bargain prices, all makes and sizes bought, sold and repaired.

EUGENE L. RICHTER ELECTRIC CO.
N. E. Cor. Uber and Columbia Ave.,
Department C. Philadelphia, Pa.

BRASS MOLDERS AND FINISHERS

A good BRASS MOLDER and a good BRASS FINISHER can make good money in Washington, D. C. I will sell out or rent my shop and tools at 1210 E Street, N. W. Business is well established and I shall be glad to send further particulars for the asking.

W. H. DOUGLAS
1210 E Street, N. W. Washington, D. C.

FOR SALE

Foreign rights of a VALUABLE PLATING APPARATUS. A device which means the saving of thousands of dollars in a year's time to any plating establishment. Scrap nickel all consumed. Terms moderate. Address,

FOREIGN PATENT, care THE METAL INDUSTRY, N. Y.

CAST IRON POTS Second Hand For Sale Cheap
Old Material of all Kinds Bought and Sold
WALSH'S SONS & CO., Newark, N. J.

FOR SALE.—A quantity of 4½ in. russet leather 18-ply buffs. Correspond with THE CRANE & BREED MANUFACTURING COMPANY, 1227 W. 8th Street, Cincinnati, Ohio.

FOR SALE—POLISHING and PLATING JOB SHOP in a Michigan city of 28,000 population; no competition. Bargain if taken at once. Reason for selling, other business. Equipment consists of one 5 horse power boiler for heating, one 5 horse power motor, two polishing lathes, good supply of polishing wheels, two plating dynamos (one 150 ampere and one 75 ampere), one 200 gallon nickel tank, one 250 gallon cyanide copper tank, one 75 gallon acid copper tank, one 140 gallon brass tank and one 60 gallon brass tank, also a good supply of anodes for all of these tanks. For further particulars, address BOX 110, care THE METAL INDUSTRY.

WANTED.—ARTISANS and CRAFTSMEN to develop their color sense with "WAGNER'S AUTOMATIC COLOR COMPASS." Fifty beautiful colors in patented device, shows harmonies and graduations. Price $1.00 with lesson. E. F. WAGNER, Studio, 70 Fifth Avenue, New York City.

FOR SALE.—One second-hand HILL CRUSHER for BRASS ASHES. Practically good as new, having been completely overmade. Will sell cheap. Address, XYZ, care THE METAL INDUSTRY.

FOR SALE.—One MODERN MOLDING MACHINE; little used, suitable for BRASS or IRON. One second-hand HILL CRUSHER as good as new, having been rehabilitated thoroughly. Address, ZYX, care THE METAL INDUSTRY.

FOR SALE.—A PHOENIX PLATING DYNAMO, about 6 volts, 1,500 amperes in first class condition. Address, THE WEHLE COMPANY, NEWARK, OHIO.

WANTED.—To correspond with buyers of METALLIC BISMUTH and BISMUTH ORES in quantity. Address Box 183, care THE METAL INDUSTRY.

METALS, MACHINERY AND SUPPLIES WANTED

CASH PAID

For Bronze Powder Waste, Gas Mantle Dust, Bismuth, Nickel Mercury, Platinum, Osmo Tridum and similar metals in any form. **JOSEF RADNAI**, 36 Fulton street, New York.

METALS, MACHINERY AND SUPPLIES WANTED—Cont'd

WANTED.—To correspond with users of metal, .005 and thinner. For further particulars, address BOX 107, care THE METAL INDUSTRY.

We PAY CASH for GOLD, SILVER and PLATINUM SCRAPS, SOLUTIONS and SWEEPINGS; Old Nickel Anodes, New or Old Mercury, Bismuth, Gas Mantle Dust and Chemicals, etc. EMPIRE CHEMICAL WORKS, 416 East 52d street, New York City.

WANTED.—A CRUSHER of medium size for grinding BRASS FOUNDRY ASHES. Must be in first class condition and sold at reasonable price. Address giving size of barrel, make, etc. MILLER-HUBBARD MFG. COMPANY, STURGIS, MICH.

OPPORTUNITIES

PLATERS

By enclosing ten cents in stamps we will forward you one of our anode protectors which will save you work and employer money and keep your solution in better condition than formerly. Address,

PLATERS NOVELTY COMPANY
Box 26, Woodhaven, L. I., N. Y.

British New Patents Act

Advertiser is desirous of undertaking the manufacture of American patents in England. Stamped work of all description. Aluminum work a specialty.

WILFRED & CO., Ltd.
BIRMINGHAM, ENGLAND

BRASS FOUNDERS

Practical information bureau, 40 years' experience with trade secrets, from the furnace to the finisher. Work in all known metals, from common brass to the secret process of tempering copper. 40 formulas, worth a thousand dollars.

PREPAID TO ANY ADDRESS ON RECEIPT OF FIVE DOLLARS.

JAMES ALLEN
2552 J Street, : : : SAN DIEGO, CAL.

J. P. FANNING, machinist, 678-Jefferson avenue, Brooklyn, N. Y.—Maker of Moulds for Casting Solder, Babbitt Metal, Bar Lead, etc. We also manufacture small work. Write for particulars.

INQUIRIES.

Inquiries received by THE METAL INDUSTRY for Metals, Machinery and Supplies. Further particulars may be obtained by addressing the inquiry number, care THE METAL INDUSTRY.

Inquiry No. 50—We would like to correspond with the manufacturer of a small grinding machine for grinding up stearic acid which we use in our metal polish.

Inquiry 51—We are in the market for brass tubing, sheet, rod and wire, and would like to hear from manufacturers of same.

Inquiry 52—We would like to correspond with the manufacturer of the "Perfect Duplex Jewelers' Solder Burner."

Inquiry 53—We would like to correspond with firms selling tin scrap.

Inquiry 54—We would like to correspond with firms in the United States making zinc tubing and sheet zinc for spinning purposes.

Inquiry 55—Would like to hear from firms manufacturing a machine for polishing sheet aluminum to take sheets 4 ft. wide by 12 ft. long and less. Also rolls for rolling aluminum into foil of .0003 in. thickness.

Inquiry 56—I am in the market for porcelain tanks for gilding purposes. Would like to hear from manufacturers.

Inquiry 57—I would like to buy a scale on which I can weigh a mixture of lead and tin, the scale indicating the number of points of tin contained in the mixture. Would like to hear from firms making such a scale.

Inquiry 58—We would like to hear from firms who can furnish us with tinned steel in long strips three or four inches wide, tinned on both sides and in the thickness of about No. 30 Brown and Sharpe gauge.

Inquiry 59—We would like to hear from the manufacturer of Babbitt Metal stamped "M. & G. Genuine."

Inquiry 60—We would like to correspond with manufacturers of machinery for the manufacturing of tripoli bricks for use in buffing and plating trades.

Inquiry 61—We are in the market for some fine castings for fixture work.

Inquiry 62—We should like to correspond with firm who can give us information regarding annealing ovens for drawn sheet metal work. The work for which information is sought is that of bath tubs and burial caskets.

TRADE WANTS

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Answers sent in our care will be forwarded.

SITUATIONS OPEN—Commercial

TRAVELLING SALESMAN WANTED

I would like to employ a man to begin at once, who has had experience in the sale of Foundry Facings and Supplies, and also has some knowledge of a plating establishment so he might offer in conjunction Buffing Compositions and Platers' Supplies. Address, stating age, salary required, etc. **SALESMAN,** care of **THE METAL INDUSTRY.**

SELLING AGENT WANTED

The manufacturer of an improved lathe chuck now in successful use in many brass goods shops desires to negotiate with parties who are in a position to handle this device throughout the United States and Canada. Address **CHUCK,** care **The Metal Industry.**

SELLING AGENT WANTED

American representative who desires to act as agent for a new annealing furnace which is suitable for the brass, copper and allied trades. Good opportunity for the right man. Address **FURNACE,** care **The Metal Industry.**

SELLING AGENT WANTED

One familiar commercially and metallurgically with metals to introduce a new bearing metal, the tests of which show excellent results. Address **AGENT,** care **The Metal Industry.**

SITUATIONS OPEN—Metallurgical

WANTED.—FOREMAN experienced as working foreman in WHITE METAL department, making SOLDER and BABBITT. Give experience and salary expected. Good opening for a steady, reliable man. For further particulars, address BOX 153, care THE METAL INDUSTRY.

WANTED.—FOUNDRY FOREMAN wanted to sell our equipment on a liberal commission basis. Address BOX 159, care THE METAL INDUSTRY.

WANTED.—FOREMAN to take charge of four MOLDING MACHINES in specialty foundry near New York having no regular molders. Must be willing to do the small amount of bench work required. For particulars address BOX 103, care THE METAL INDUSTRY.

SITUATIONS OPEN—Mechanical

WANTED.—RIVET MAKER. First class mechanic who understands the running of double stroke headers. Permanent position with good pay. Apply METALLIC SPECIALTY MFG. COMPANY, 1616 N. 21st Street, Philadelphia, Pa.

WANTED.—A first-class BRASS FINISHER who is capable of doing all round work. Must be sober, industrious and not afraid of work. Good wages and a permanent position to the right kind of a man. Address O-4, care THE METAL INDUSTRY.

WANTED.—A first-class PATTERN FILER who is capable of doing all round bench work. Must be sober and a hustler. Address O-6, care THE METAL INDUSTRY.

SITUATIONS OPEN—Chemical

WANTED.—A first class PLATER for high grade light weight work, particularly BRASS, COPPER and NICKEL. Factory has not been run on short time in several years. Address BOX 163, care THE METAL INDUSTRY.

SITUATIONS OPEN—Chemical—Continued

WANTED.—A man to take charge of a PLATING ROOM; a man with some mechanical ability who is a good plater on all solutions and who can handle some help. We will pay highest wages. Address O-25, care THE METAL INDUSTRY.

WANTED.—A first-class POLISHER and BUFFER who is capable of doing all round work. Must be a hustler and not afraid to work. Good wages and a permanent position to the right man. Address O-5, care THE METAL INDUSTRY.

SITUATIONS WANTED—Commercial

Advertisements under this head will be insterted for 20 cents per line, 3 lines for Half a Dollar.

SITUATION WANTED.—Sales Agent or Sales Manager open for engagement with BRASS MILL of capacity for the sale of sheet brass, wire, rods, tubing, German silver, pin and hook and eye wires. Thoroughly acquainted with territory people from Connecticut to Chicago and can produce results. J. O. CRANE, care THE METAL INDUSTRY.

SITUATION WANTED.—Superintendent or Manager with a large experience in the manufacture of BRASS GOODS from sheet, rod, tubing and castings. Familiar with all details of factory and office. Also a good salesman. Address BOX 149, care THE METAL INDUSTRY.

SITUATION WANTED.—As SUPERINTENDENT or ASSISTANT SUPERINTENDENT of manufacturing plant, preferably in METAL GOODS. Twenty years' experience, familiar with modern up-to-date methods of producing work at lowest possible cost. First class executive ability. Moderate salary. Can furnish best of references. Address BOX 116, care THE METAL INDUSTRY.

SITUATION WANTED.—Experienced BRASS factory man is open for engagement. Thorough executive from FOUNDRY to SHIPPING ROOM. Expert Cost Accountant and Purchasing Agent. Advocate of piece work and bonus systems. Can decrease labor cost and increase output. If you can use a man of my qualifications, address BOX 161, care THE METAL INDUSTRY.

SITUATION WANTED.—SALESMAN experienced in both steam and plumbing lines is open for a position. Thorough acquaintance with the trade in all sections except Pacific Coast. Knows the business thoroughly and can sell goods. Address Box 162, care THE METAL INDUSTRY.

SITUATION WANTED.—A first class ACCOUNTANT familiar with office work in the METAL TRADE. Can furnish the best of references. Address BOX 118, care THE METAL INDUSTRY.

SITUATIONS WANTED—Metallurgical

SITUATION WANTED.—BRASS FOUNDRY FOREMAN desires a position. Sixteen years' experience. Up-to-date with molding machines and oil furnaces. Specialties injectors, globe valves, all kinds of steam and plumbers' goods. Address BOX 148, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class COREMAKER who has had a large experience in this line of work. Can furnish the best of reference. Address BOX 137, care THE METAL INDUSTRY.

SITUATION WANTED.—By a MOLDER as Assistant Foreman. Thoroughly familiar with all kinds of molding machines. Can handle help to advantage. Age 32. Will take position on machine or tub. Address BOX 138, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class FALSE CORE MOLDER in French sand. Understands all branches in green sand, also in dry work. Position as FOREMAN desired. Can take charge of men. Address BOX 134, care THE METAL INDUSTRY.

SITUATION WANTED.—Foreman, 37 years old, thoroughly familiar with light duplicate work. Experienced in mixing metals, handling power and hand molding machines. Oil and coke furnaces. Up-to-date methods of running a foundry. Address BOX 160, care THE METAL INDUSTRY.

SITUATION WANTED.—FOREMAN MOLDER would like a position. Thoroughly familiar with all classes of work in this line. Address BOX 164, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class false core molder in brass and bronze. Capable of taking charge. Address BOX 154, care THE METAL INDUSTRY.

SITUATION WANTED.—Position as FOUNDRY FOREMAN or SUPERINTENDENT in brass. Have had twenty years' experience and can give the best of references. Do my own mixing. Address O-21, care THE METAL INDUSTRY.

TRADE WANTS

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SITUATIONS WANTED—Metallurgical—Continued

SITUATION WANTED.—By an experienced BRASS FOUNDRY FOREMAN familiar with all branches and classes of work. A good MIXER, and can furnish the best of references. Address CU, 341 Genesee street, Rochester, N. Y.

SITUATION WANTED.—By a BRASS FOUNDRY FOREMAN who is thoroughly familiar with the trade. Will go to any State where opportunities and chances for advancement are good. Address BRASS, No. 3 Farragut street, Rochester, N. Y.

SITUATION WANTED.—A first class BRASS FOUNDRY FOREMAN, up to date in all its branches. Has had 26 years' experience and thoroughly understands the business. Address Box 120, care THE METAL INDUSTRY.

SITUATION WANTED.—By a BRASS FOUNDRY FOREMAN or SUPERINTENDENT with 20 years' experience. Well posted on molding machine work, also manganese bronze, phosphor, bronze and aluminum castings. Also well posted on new and old metals and all kinds of automobile castings. Can furnish the best of references. Address BOX 121, care THE METAL INDUSTRY.

SITUATION WANTED.—A FOUNDRY FOREMAN of 20 years' experience wants position. Is capable of taking charge of valve and plumbers' brass goods foundry; is experienced in mixing metals; has had charge for 6 years of plant melting 6 to 8 tons per day. Can furnish best of references. Address BOX 122, care THE METAL INDUSTRY.

SITUATION WANTED.—Brass Foundry Foreman, 37 years old, thoroughly familiar with light duplicate work. Experienced in mixing metals, handling power and hand molding machines. Oil and coke furnaces. Up-to-date methods of running a foundry. Address BOX 160, care THE METAL INDUSTRY.

SITUATIONS WANTED—Mechanical

SITUATION WANTED.—By a practical BRASS WORKER. I am at present foreman over machine shop, polishing room, tool room and pattern makers in a leading brass shop, but desire a change. Address BOX 141, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class METAL GRINDER and FILER with several years' experience in this line of work. Can furnish the best of reference. Address BOX 139, care THE METAL INDUSTRY.

SITUATION WANTED.—By two DIE SINKERS wishing to make a change, together or separate. Wide experience on flat, hollow ware and jewelry, etc.; willing to go anywhere. Address J-8, care THE METAL INDUSTRY.

SITUATIONS WANTED—Chemical

SITUATION WANTED.—FOREMAN PLATER desires a position with NOVELTY OR BUCKLE MANUFACTURER. Thoroughly familiar with all solutions and finishes on BRASS, German Silver, Britannia and Soft Metals. Can take charge of help to advantage. Address BOX 145, care THE METAL INDUSTRY.

SITUATION WANTED.—By an ELECTRO PLATER at present in charge of a large plant in Western Connecticut who would like to make a change. Broad, practical experience. Economical and up-to-date methods. Familiar with all solutions and finishes. Address BOX 146, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER who has had 10 years' experience in Gold, Silver, Nickel Plating. Novelty work a specialty. Can furnish the best of reference. Address BOX 147, care THE METAL INDUSTRY.

SITUATION WANTED.—In a SILVER MANUFACTURING PLANT or in a PLATING ROOM by a Superintendent and Foreman. Twenty years' experience in all kinds of plating, and is thoroughly familiar with all the different finishes. Expert in plating NON-METALLIC SURFACES. Address BOX 142, care THE METAL INDUSTRY.

SITUATION WANTED.—By a plater who has made a specialty of GALVANO PLASTIC WORK. Can furnish the best of reference. Address BOX 143, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class PLATER, POLISHER and BUFFER. Twenty years' experience in all branches of plating work. Expert in all solutions and finishes, silver deposit, galvano plastic, metallizing non-metallic subjects, cold galvanizing, lacquering. Sober, reliable, and can furnish the best of reference. Address BOX 151, care THE METAL INDUSTRY.

SITUATIONS WANTED—Chemical—Continued

SITUATION WANTED.—By a PLATER thoroughly familiar with Nickel, Silver, Brass, Copper plating and oxidizing. Can furnish the best of reference. Address BOX 140, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER who thoroughly understands polishing and buffing. Large experience on plumbers' supplies, builders' hardware and job shop work. Thoroughly capable of taking charge of plating room. Address BOX 135, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class ELECTRO PLATER and FINISHER who understands gold, silver plating, oxidizing, fire dipping and polishing. Nine years' experience on A-1 sterling silver work. Address BOX 136, care THE METAL INDUSTRY.

SITUATION WANTED.—Foreman NICKEL PLATER and POLISHER. Large experience in stove works, and would prefer such a position. Address BOX 130, care THE METAL INDUSTRY.

SITUATION WANTED.—PLATER up-to-date in ALL FINISHES. Six years' experience and can furnish the best of reference. Address BOX 131, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER whose specialty is BRASS, COPPER and SILVER. Understands all the finishes, dipping and oxidizing. Small town preferred. Address BOX 132, care THE METAL INDUSTRY.

SITUATION WANTED.—NICKEL and BRASS PLATER. Forty years old, sober and industrious. Experienced in the making of all solutions. Steady position desired. Moderate wages. Address BOX 133, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER thoroughly understanding Brass, Bronze, Cyanide Copper, Acid Copper, Nickel, Black Nickel, Silver, Electro and Dip Gold Solutions. Can produce Rose Green, Ivory, Roman Gold, Silver Oxidize and different finishes in the novelty and buckle line. Burnishing and Lacquering in all details. Address N-4, care THE METAL INDUSTRY.

SITUATION WANTED—By a PLATER of 18 years' experience; 12 years as FOREMAN for large concerns. Thoroughly up-to-date on all solutions, dips and finishes, including Silver Deposit, etc., and rapid methods of turning out work. Sober, reliable and industrious, and can furnish the best of references. Would like to hear from firms desiring the services of a first class man. Address O-17, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER on Gold, Silver, Black Nickel, Brass, Bronze and Tin. Plating Verde Green, Oxidizing. Address O-22, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first-class PLATER who wishes to change position. Expert on BRASS SOLUTIONS. Address S-3, care THE METAL INDUSTRY.

SITUATION WANTED.—By FIRST CLASS PLATER AND POLISHER. Has had 16 years' experience and had charge of men for the last 10 years. Can handle any kind of a plant, understands all finishes and can give good reference. Address O-19, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER who is thoroughly familiar with GOLD, SILVER and all finishes. Have had experience in deposit work. Married man, 38 years of age. Address GOLD, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER who is an expert on NICKEL, BRASS and COPPER PLATING. Would like to secure a position with a good automobile company or a firm that has a large NICKEL PLATING PLANT. Address O-15, care THE METAL INDUSTRY.

SITUATION WANTED.—By a First Class PLATER with several years' experience. Can furnish the best of references. Address O-20, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class GOLD, SILVER, NICKEL, BRASS or COPPER and all round PLATER to take charge of large plating plant. Can give the best of references and will consider no position unless steady. Address O-13, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class ELECTRO PLATER. Brass solutions a specialty, also Gold, Silver, Nickel and antique finishes. Can furnish the best of references. Address L. H., care THE METAL INDUSTRY.

SITUATION WANTED.—FOREMAN PLATER is open for engagement after January first. Young man with several years' experience. Familiar with ALL SOLUTIONS and FINISHES. Lowest salary $1,500 per year. Address BOX 117, care THE METAL INDUSTRY.

TRADE WANTS

AN EXCHANGE FOR THE WANTS OF THE METAL TRADES.

Advertisements will be inserted under this head at 40 cents per line, 3 lines one dollar, for each insertion, excepting Situations Wanted, 20 cents per line, 3 lines half a dollar. Answers sent in our care will be forwarded.

SITUATIONS WANTED—Chemical—Continued

SITUATION WANTED.—By a PLATER, POLISHER and BUFFER with 15 years' experience. Hustler and can produce good work. Sober, reliable and can furnish the best of reference from my last employer. Would like to locate west of Chicago. Address BOX 150, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER with 15 years' experience in some of the best plating and polishing rooms in the country. Stove work, scale work, electric fixture work, hollowware and jewelry work. Can furnish best of reference. Address BOX 158, care THE METAL INDUSTRY.

SITUATION WANTED.—As plater or foreman plater, with 25 years' experience. Also understands buffing and polishing. Address BOX 155, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER with 18 years' experience in plating business, 10 years' experience as foreman of plating and buffing departments. Address BOX 156, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER who thoroughly understands plating on all metals, especially ormolu, French gray, nickel, brass, copper. Also experienced in silver finishing, soft metal polishing on steel or brass. Address BOX 152, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER with 30 years' experience in all kinds of finishes. Expert on ROYAL COPPER. Wages expected $15.00-$18.00. Can furnish the best of reference. Address BOX 144, care THE METAL INDUSTRY.

SITUATION WANTED.—By PLATER with 28 years' experience in all metals, including platinum. Should be glad to hear from firms desiring the services of a first class plater. Address BOX NO. 8, care THE METAL INDUSTRY.

SITUATION WANTED.—FOREMAN PLATER would like to change position. Have had 18 years' experience on ALL SOLUTIONS and FINISHES. Fine work a specialty. Can furnish the best of references. Address BOX 119, care THE METAL INDUSTRY.

SITUATION WANTED.—By a first class PLATER to take charge of a coloring room in a jewelry shop. Thoroughly familiar with all up-to-date colors. Can furnish reference. Address BOX 157, care THE METAL INDUSTRY.

SITUATION WANTED.—By a FOREMAN PLATER who can handle help to advantage. Can also do polishing and buffing. Nine years' experience, and can furnish best of reference. Address BOX 165, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER who has had a long experience in the plating business. Thoroughly understands all solutions and finishes. Address BOX 166, care THE METAL INDUSTRY.

SITUATION WANTED.—By an all round PLATER who has had considerable experience on all kinds of work, such as hollowware, chandeliers, jobbing, etc. Thoroughly understands all solutions, oxidizing and dipping. Address BOX 167, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER who has had 20 years' experience in plating, bronzing, lacquering, etc. Can furnish best of reference. Address BOX 168, care THE METAL INDUSTRY.

SITUATIONS WANTED—Chemical—Continued

SITUATION WANTED.—By a PLATER with 15 years' experience, thoroughly understanding all solutions, silver deposit, galvano plastic work, etc. Address BOX 169, care THE METAL INDUSTRY.

SITUATION WANTED.—PLATER understanding every branch of the trade, thoroughly familiar with all solutions, dips, etc., would like a position. Address BOX 170, care THE METAL INDUSTRY.

SITUATION WANTED.—As a FOREMAN or ASSISTANT FOREMAN PLATER. Thoroughly familiar with all kinds of plating, oxidizing, etc. Address BOX 171, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER of 16 years' experience, understanding all solutions, including verde antique. Address BOX 172, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER with 12 years' experience, thoroughly understanding 411 details of the plating trade. Can furnish excellent reference. Address BOX 173, care THE METAL INDUSTRY.

SITUATION WANTED.—A first class PLATER who is at the present time employed but desires to change, would like to hear from firms desiring a man who thoroughly understands the plating, buffing, etc., of all metals. Address BOX 174, care THE METAL INDUSTRY.

SITUATION WANTED.—By a young man who has had 8 years' experience. Can do all kinds of PLATING and FANCY COLORING. Address BOX 175, care THE METAL INDUSTRY.

SITUATION WANTED.—By an ELECTRO PLATER on brass, copper, nickel, silver and gold solutions. Can also do scratch brushing on silver and gold. Address BOX 176, care THE METAL INDUSTRY.

SITUATION WANTED.—By a plater who thoroughly understands the plating, polishing, oxidizing and enameling on iron and brass. Long experience as foreman of different departments in plating plants. Address BOX 177, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER who has had a long experience as Foreman of Plating, Polishing and Buffing Departments. Thoroughly familiar with all solutions and can furnish the best of reference. Address BOX 178, care THE METAL INDUSTRY.

SITUATION WANTED.—By a PLATER who has had 14 years' experience in the plating trade. Understands all solutions and can furnish the best of reference. Address BOX 179, care THE METAL INDUSTRY.

SITUATION WANTED.—By an expert NICKEL and COPPER PLATER who can furnish the best of reference. Address BOX 180, care THE METAL INDUSTRY.

SITUATION WANTED.—By an ELECTRO-PLATER, 18 years' experience with Nickel, Copper, Brass and Bronze solutions and oxidizing. Can furnish good reference. Address BOX 181, care THE METAL INDUSTRY.

SITUATION WANTED.—By an all round DEPOSIT EXPERT. Practical man in all its branches. A first class Designer, Engraver, and Etcher, having a fine white paint, one paint for silver and china. Also plate wood, horn and natural flowers and ornamental electrotyping on rubber. Address, BOX 182, care THE METAL INDUSTRY.

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¶ Our Want Ad. Page is a Regular Exchange for supplying the immediate wants of the Metal Trades.

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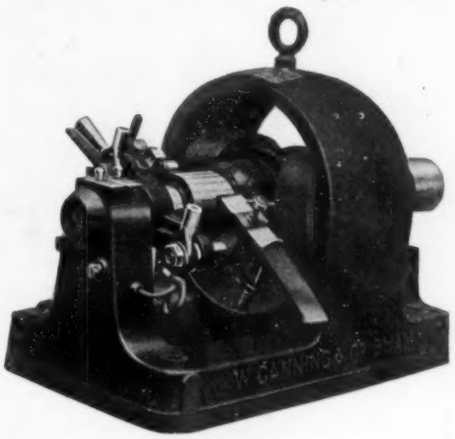

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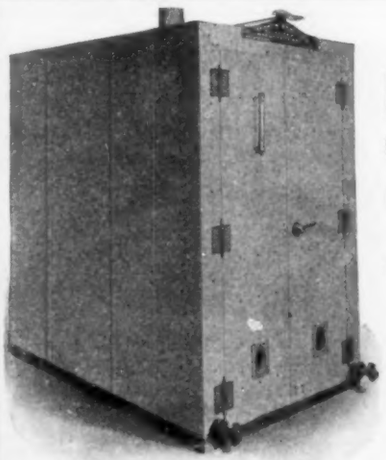

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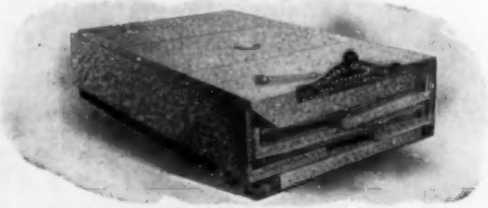

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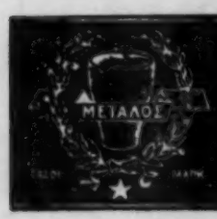

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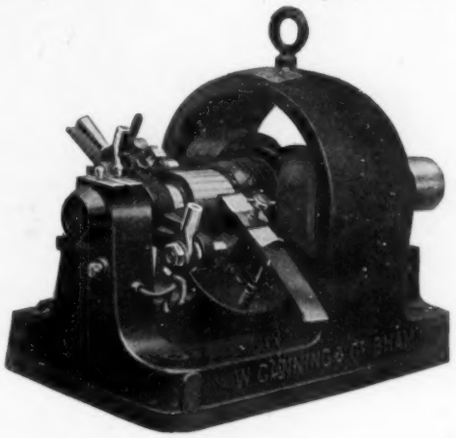

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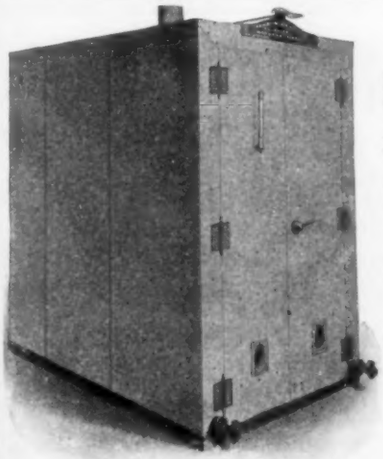

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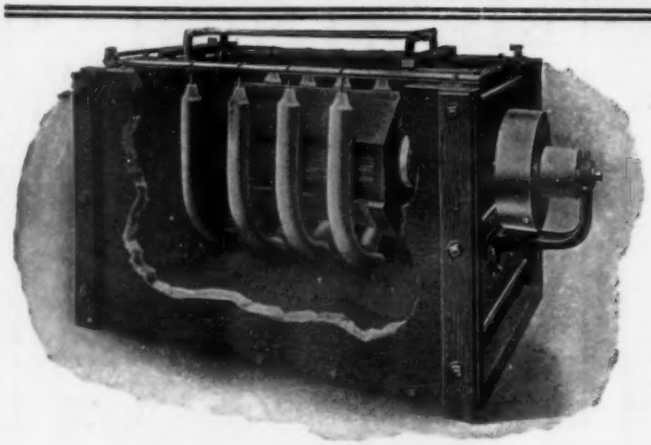

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This apparatus is a proved money saver where small work is to be plated. Can be used in Nickel, Copper, Brass, Zinc and Silver Solutions.

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Basket can be removed at will—without interfering with drive. In larger sizes basket is raised and lowered automatically.

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We Can Furnish a List of Over 200 Users of this Apparatus. Many of the Larger Firms Are Using 10 or more

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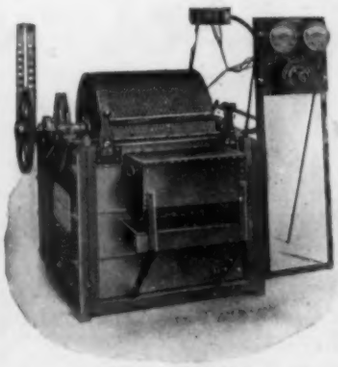
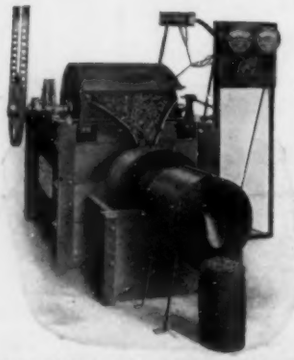
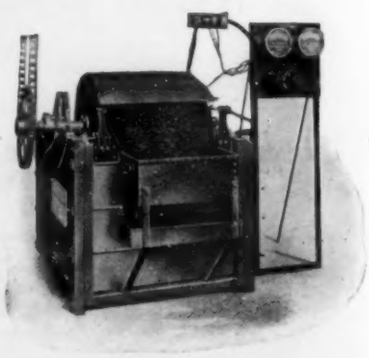


View while Plating.



Provided with Patent Apparatus for Automatically Washing, Drying, Delivering Material.



View while Emptying.

ALL ABOVE MENTIONED OPERATIONS ARE ACCOMPLISHED BY SIMPLY REVERSING MOTION OF BARREL.

ELECTRO PLATING AND GALVANIZING OUTFITS

BY USE OF OUR PATENT HANDLING DEVICES SAVING 50 PER CENT. IN LABOR COST.

DYNAMOS UP TO 8,000 AMP. POLISHERS' AND BUFFERS' MACHINERY AND SUPPLIES, CHEMICALS, ANODES (CURVED), LACQUERS, ETC.

U. S. ELECTRO GALVANIZING CO.

Main Office and Factory, No. 1-9 Park Ave.

BROOKLYN, N. Y.

Branch and Warehouse, 229 Pacific St.

THE TRIPLEX BUFF

A New Buff that is rapidly supplanting all other kinds. The letters printed below prove that old style Buffs are now obsolete

In 1907 this Buff was patented; since then its success has been almost phenomenal. The secret of its great wearing qualities is in the FOLD. Its economy is due to the fact that EVERY STRAND OF MUSLIN is used up in doing actual work. When the wheels are worn down the stubs may be returned to us and made into new wheels at nominal cost, using two old wheels to make one new wheel of approximately double the diameter of the old. Read what a few of our customers say:

Victor Talking Machine Co., Camden, N. J.

With one [Triplex] wheel we buffed four hundred pieces of our part 714A and three hundred pieces of our part 705A, while with one of our regular buffs we can do only two hundred pieces of our part 714A and two hundred and fifty pieces of 705A, both buffs using about the same amount of Tripoli, but the Triplex buff is much cleaner. Therefore, according to this report, the Triplex buff does more than again as much work as an ordinary buff.

Pittsburgh Lamp, Brass and Glass Co., Pittsburgh, Pa.

We have been using buffs made under the Painter Patent since June 18th last, and notwithstanding our increased business this year, our saving in buffs alone has been about $500, and we feel safe in saying that these savings will exceed at the rate of $100 per month for the year 1907. Our foreman's account shows that one wheel made of eight sections, eighteen ply each, under the Painter system, has done as much work as three wheels of same dimensions and quality made of loose buffs. In Tripoli composition we find a saving of about 20 per cent.

In addition to the above, our men are doing more work, better work, and they claim with an expenditure of less labor and physical force.

The Bryant Electric Co., Bridgeport, Conn.

We consider them to be the best buff we have ever used at any price, and we expect to use them practically exclusively when our stock of the old type is exhausted.

John L. Gaumer, Philadelphia, Pa.

Economy, therefore, will dictate that your Patent Buffs will take the place of the old methods.

Send for Description of our New Two-Bar Silverite Nickel Anode

IMPORTANT NOTICE

Any folded buff not stamped with our trade mark "TRIPLEX," used or sold is an infringement on our license patent and our rights in this respect will be strictly enforced.

We will gladly send a man to demonstrate these wheels on your own work. Send in your orders NOW—they will be filled in regular order at current prices. Send for descriptive bulletin TB.

ZUCKER & LEVETT & LOEB CO., New York City, U. S. A.

Electro-Galvanizing Outfits Without Royalty on Solution. Low Voltage Generators; and Direct Connected Generator Sets, 50 to 10,000 Amperes Capacity. Complete Plants Installed and All Supplies for Electro Plating and Polishing.

THE finish on metal novelties is as important as beauty of design.

USE OUR PRODUCTS

Our Green Gold Anodes
Our C. P. Gold 1000/1000 fine

FOR ROMAN OR ROSE WORK

Our Oxvdizing Fluid

ON SILVER AND SILVER-PLATED GOODS

Obtain that classy effect, the delight of the connoisseur

H. F. CARPENTER & SON

Gold and Silver Refiners

58 and 60 Page St., PROVIDENCE, R. I.

The C. P. Gold People

SWAN & FINCH COMPANY

ESTABLISHED 1853. INCORPORATED 1892.

Direct Importers of Palm, Cocoanut, Olive and Cod

OILS

Refiners and Dealers in All Grades of Lubricating Oils and Greases, including Tempering Oils, Fish and Whale Oil Soaps, and

PLATERS' COMPOUND

HOME OFFICE:

151 Maiden Lane - New York

"ELECTRIC" CLEANING COMPOUND

IS ADAPTED FOR CLEANING ALL METALS BEFORE PLATING

Cleveland, O., January 4, 1909

Cleveland Platers Supply Co., City

Gentlemen:—I have had charge of the plating department of The North Electric Co., of this city, for the past four years, and have been using your "Electric" Cleaning Compound since November, 1907. Prior to the time of trying out your compound, I had been using a cyanide and potash electric cleaner continually for three years.

My fourteen months' experience with your compound has demonstrated that it is a better cleaner, in every respect, than the cyanide and potash cleaner. Not only does the "Electric" compound clean all of my polished brass and steel work thoroughly, but I also use it for cleaning large quantities of soldered tin boxes, and also zinc transmitter fronts. Before using your material, this tin and zinc work had to be hand scrubbed, as it could not be cleaned in the cyanide and potash cleaner without becoming badly stained and oxydized.

Our work consists of telephone parts, and our output is very large, but I do not find it necessary to scrub any of the work.

The expense for making up and maintaining your cleaning solution is about one-half as much as for the cyanide and potash cleaner. Yours truly,

THOS. SWEENEY

(Publication of above letter sanctioned by The North Electric Co.)

Sold only by

CLEVELAND PLATERS SUPPLY CO.

113 St. Clair Ave., N. E. Cleveland, Ohio

"CLEANING BY ELECTRICITY," a booklet on electric cleaning, mailed free to any address

The American Tripoli Company

For twenty years grinders of

MISSOURI TRIPOLI FLOUR

in all grades and colors—"Rose," "Cream" and "White."

Missouri Tripoli is the most effective **very fine** abrasive known. Our finest grade—"Air-Dust"—is an impalpable powder, and yet a very fine abrasive.

Our Tripoli Flour is used by all manufacturers of Buffing Compositions, Metal Polishes, Polishing Rouges, etc., etc., and by many of the manufacturers of Mechanics Soaps, Scouring Soaps, Cleaners, etc.

We shall be glad to quote prices upon application.

TRIPOLI FLOUR MAY BE JUST WHAT YOU WANT.

American Tripoli Company
Seneca, Missouri
(Also Tripoli Stones for Water-filters)

E. REED BURNS

MANUFACTURER OF

Brass and Nickel Platers' Supplies

40 and 42 WITHERS STREET
BROOKLYN, N. Y.

WRITE FOR PRICES

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Annealing Without Oxidation by Automatic Machines

BATES & PEARD ANNEALING FURNACE CO.
C. M. DALLY, Agent, 29 Broadway, N. Y.

NO PICKLING **Large Saving in Labor and Fuel**
NO SCALE Illustrated Catalogue Sent on Application.

MILLER ELECTRIC CO.

16-20 William St., NEWARK, N. J.

Importers and Manufacturers of

Platers' and Polishers' Supplies
HIGH-CLASS POLISHING WHEELS
For Grinding, Buffing and Polishing
Makers of the Celebrated "WALRINE" Leather Wheel

NICKEL SALTS AMYL ACETATE CYANIDE POTASH BISMUTH CADMIUM

These are only a few of the chemicals sold by us. Send for complete list.

We have high grade material at low prices.

FOR PLATERS AND BRASS MANUFACTURERS

Correspondence Solicited

McKESSON & ROBBINS

Manufacturing Chemists **NEW YORK**

"A Composition for Cheapness,

and not for excellence of workmanship, is the most frequent and certain cause for the rapid decay and entire destruction of arts and manufacture."

The Lacquer has more to do with selling your goods than any other one thing. Why not use the reliable "NIKOLAS" brands and thereby prevent destruction?

G. J. NIKOLAS & CO.

85 Centre Street, NEW YORK **400 W. Van Buren Street, CHICAGO**

WARNING

The success of the EUREKA SPRAYER in applying lacquer, japan, enamel, bronze, paints, etc., has led unscrupulous persons TO IMITATE AND INFRINGE OUR PATENTS OF MARCH 25th, 1902. Users and sellers are alike liable, and our attorneys Dunn and Turk, Park Row Building, New York, are instructed to protect our rights. AVOID INFRINGEMENTS, USE THE ORIGINAL AND LEGITIMATE EUREKA SPRAYER.

EUREKA PNEUMATIC SPRAY CO.

400 Canal Street - - - - NEW YORK

LACQUER

Is Seemingly a Small and Unimportant Thing

But a poor Lacquer makes itself obnoxiously important through discoloring, peeling off, and the necessity of refinishing the work.

The user does not need to worry if he uses Lacquers made by

The Egyptian Lacquer Manufacturing Company

152 Front Street, New York City

ZAPON LACQUERS

PLEASE

THE LACQUER MAN
Easily Applied. Absolutely regular in quality.

THE SALES DEPARTMENT
Goods reach customers perfect in finish.

THE PURCHASING AGENT
Our prices are right—full value for every dollar.

We Try to Treat Everybod, Right.

Our Customers are Our Friends.

GELLULOID ZAPON CO., WORKS Stamford, Conn.

Sales Department 310 FOURTH AVENUE, NEW YORK CIT Metropolitan Building

"New Era" Lacquers HAVE QUALITY

We Buy Quality, Talk Quality, GIVE QUALITY

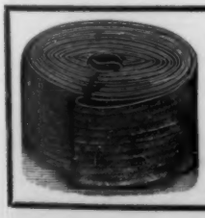
"Quality is the underlying principle of the most successful businesses."

The manufacturer who calls your attention to the low price of his product has little else to talk about. While we try to keep within the bounds of Low Prices, we do not make a specialty of it.

We can satisfy anyone who is wise enough to see the value of the BEST regardless of the shade difference in the cost.

THE NEW ERA LUSTRE CO.

NEW HAVEN - - - - - - - - - - CONN.



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CHICOPEE, MASS.

Manufacturers of

ENDLESS SEWED POLISHING BELTS

Correspondence Solicited *Discounts Quoted*

POLISHING BELTS and TAPE

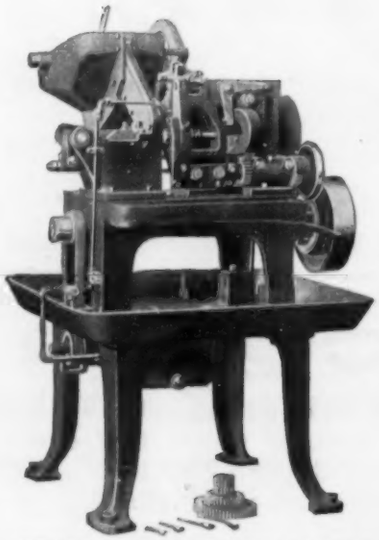
ALL KINDS

Any width or thickness made to order on short notice and large stock always on hand.

GILMER COMPANY

PHILADELPHIA PA.

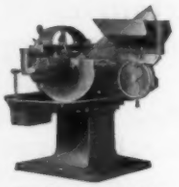
SCREW-MAKING MACHINERY



AUTOMATIC SCREW SLOTTING MACHINE

The illustration opposite shows an improved Automatic Slotting Machine for cutting slots across the heads of screw blanks such as fillister head screws, stove bolts and other work of a similar nature.

Our experiments and study preliminary to the designing of this machine were directed toward obtaining accurate work at a rapid rate of production and especial attention was paid to the **rigidity** and output of the slotter. We solicit inquiries regarding this machine as well as descriptions or samples of the work to be done on it.



SCREW THREAD ROLLERS.

AUTOMATIC

SCREW BLANK HEADERS.

THE WATERBURY FARREL FOUNDRY AND MACHINE CO.

CLEVELAND OFFICE, 1012 WILLIAMSON BLDG.

WATERBURY, CONN., U. S. A.

We also build Automatic Rivet and Nut Machinery, Thread Rolling Machines, Drop Presses, Automatic Drop Hammers for Forging, Chain Draw Benches, Hydraulic Machinery, Pumps, Accumulators, Power Presses, Rolling Mills, Shears, Slitters, Finishing Machinery for Sheet Brass, German Silver, etc.

THE STEVENS' SYSTEM

That's the system of having every man on the job, going the same way, getting there at the same time and doing it in an easy canter.

It's the spirit of concentration, that is, o your interests—comfort, convenience and ease; when the old horse goes to town, three are carried as easily as one and it costs no more. My men on the road sell supplies for the GREY IRON FOUNDRY, the BRASS FOUNDRY and the POLISHING and PLATING ROOM.

One man does the work of three men, from three of my competitors, for one third the cost; so I can sell you for one third the slice of profit and you keep the other two thirds; besides, in concentrating your orders with me, you concentrate time, and time is about the most expensive item on your pay-roll.

I keep up the quality end too; that is one of the most important features of the system.

I manufacture the whole bunch, so in buying from me you are right on the ground floor and no basement underneath.

Confidentially—I can take care of a few more orders—Next!

FREDERIC B. STEVENS

EXPORT WAREHOUSE, WINDSOR, ONTARIO.

Cor. Larned & Third Sts., Detroit, Mich.